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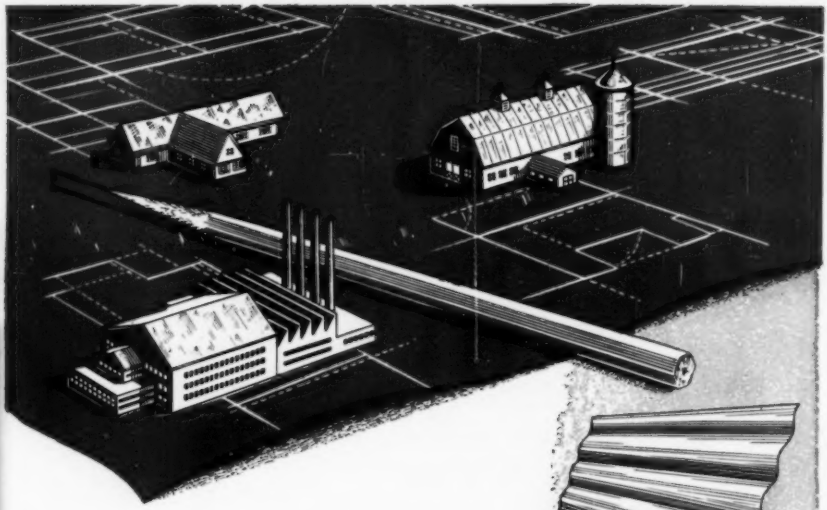
MAY 1952

BUSINESS · ENGINEERING · INDUSTRY

J. L. McCaffrey Builds IH Abroad — Page 57



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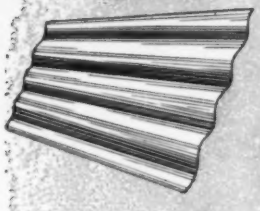

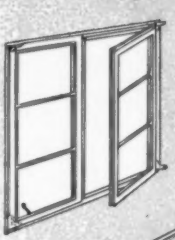

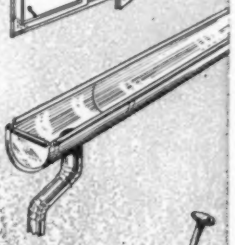

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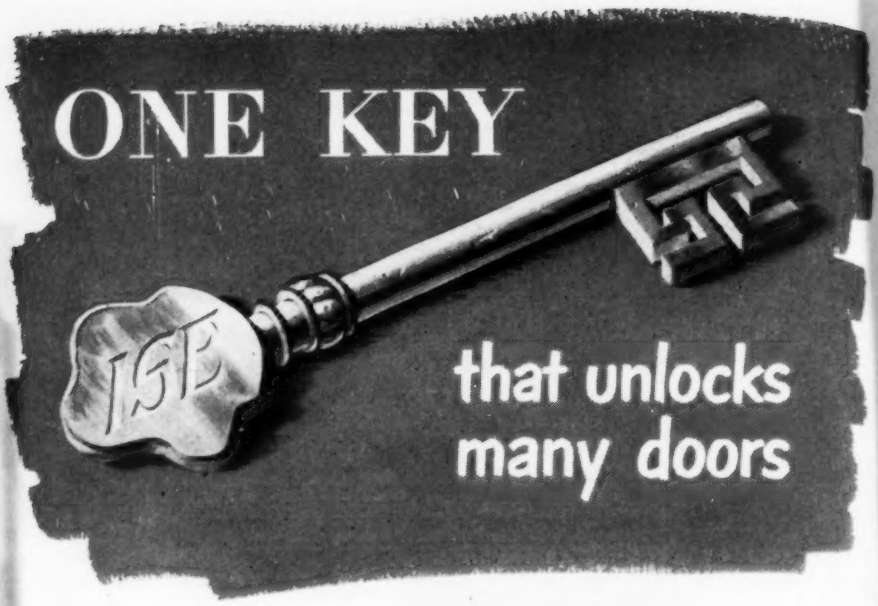

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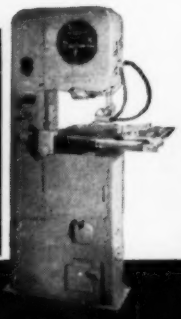

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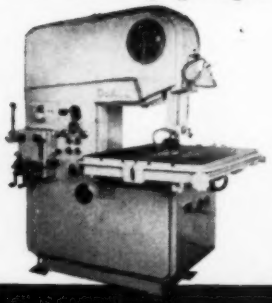

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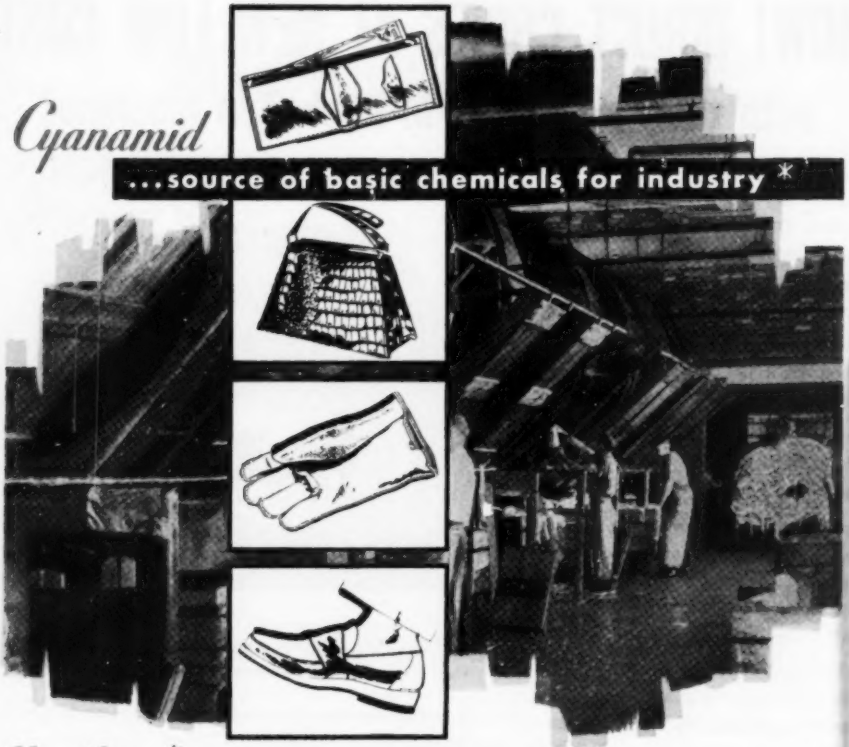

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BUSINESS TRENDS

PRICE WEAKNESS in the U. S. during the early months of 1952 does not mean recession is imminent. Commodity prices have slipped. Prices of some consumer goods have been cut. And more declines are likely before the year is over, especially in the later months. But the U. S. economy is fundamentally strong.

Basic economic forces will support a high level of business right through 1952. Key forces are defense spending, capital spending by business, and other construction needs. Spending for defense is now scheduled to reach an annual rate of $58-billion by the end of 1952, compared with $48-billion now. The federal deficit will mount every month through the rest of the year, except for June and possibly September.

U. S. business plans to spend more than $24-billion on new plants and equipment—a new record. Together, defense and capital spending will keep business humming for a major portion of U. S. manufacturing and mining industry.

New construction is running close to last year's record pace of $29.9-billion. That means steady employment for almost 3-million highly paid workers. Some types of building have been cut by shortages of materials. But others, notably military and industrial construction, are booming. And home-builders expect to put up another million-plus new housing units this year.

Commodity price drops in the past few months were a reaction from speculative advances that took place in 1951, rather than a reflection of basic weakness in business. Prices are more likely to go up than down during the next few months, then turn steady and downward in the late summer and fall. That is the normal seasonal pattern. And declines at the end of 1952 may be a little stronger than usual if farmers raise the big crops expected this year. But good business generally is assured through 1952.

But some recent price changes are significant. They show the trends of supply and demand in particular markets. Industry is increasingly resorting to price cuts to maintain lagging sales volume. Price cutting may be the big business story by 1953.

Signs of increasing competition for the retail shopper's dollar are already showing up. Some price cuts on the retail and wholesale level are resulting.

Most major television companies cut prices recently. Less than $100 can now buy a television set with 20-in. screen. One company has announced that it is really going after a major share of the market, will keep prices down as a competitive measure.

These price cuts are still limited to a few products—though there are rumors that they will soon spread to refrigerators, freezers, and other major electrical

appliances. But they indicate that a "buyers' market" is about to return for the first time since before the war. Although U. S. consumers have more money than ever before, they are being choosy about what they buy.

Competition is likely to spread into other fields, too. Reason is the tremendous expansion in U. S. capacity to produce goods. By the end of 1952, the U. S. will have 12% more steel capacity, 75% more aluminum capacity, and 22% more chemical capacity than it had at the end of 1950. And capacity to turn these goods into finished products is way up, too—16% rise in 2 years.

This huge increase in capacity means the U. S. will soon be able to satisfy the great demand from defense, capital expansion, construction—without inflation—and still supply consumers with a normal amount of goods.

Once production for consumers returns to pre-Korea levels—sometime this fall—more companies will face the problem of selling. And makers of other products, like industrial machinery, will discover that buyers are harder to find once present abnormal demand begins to wane.

Exporters to the U. S. will face the same problem. They have recently had a strong taste of competition, as U. S. consumers refused to buy goods in the big quantities expected of them. But the competition among both consumer goods and commodities is likely to get stronger from now on. For foreign sellers, that means some extra problems, too—probably including more efforts (p13) to get the U. S. Congress to raise additional tariff barriers to protect U. S. industries.

ATOMIC ENERGY is a big and growing U. S. industry. Atomic facilities will soon be greater than those of U. S. Steel and General Motors combined. The U. S. has spent more than $6.3-billion on atomic energy, is considering further expansion costing $5-billion to $6-billion more.

Use of fission products is the most promising industrial application so far. "Cold sterilization" of foods is talked up as a big development for the future. Some foods and drugs are sensitive to heat, thus hard to sterilize by traditional methods. But they can be sterilized without heat by gamma rays. Processes are being worked out; application is expected within 2 to 5 years.

Atomic power is being studied by eight major U. S. firms. Their reports should be completed within the next 2 months. If reports are optimistic, they are likely to start building reactors soon.

Large-scale power production probably will not be economically feasible in the U. S., at least not within a good many years, because of cheap hydro power and tremendous fuel reserves. But atomic energy may be a great boon for countries less well endowed with conventional fuels, such as Brazil with its inadequate or poorly located sources of power.

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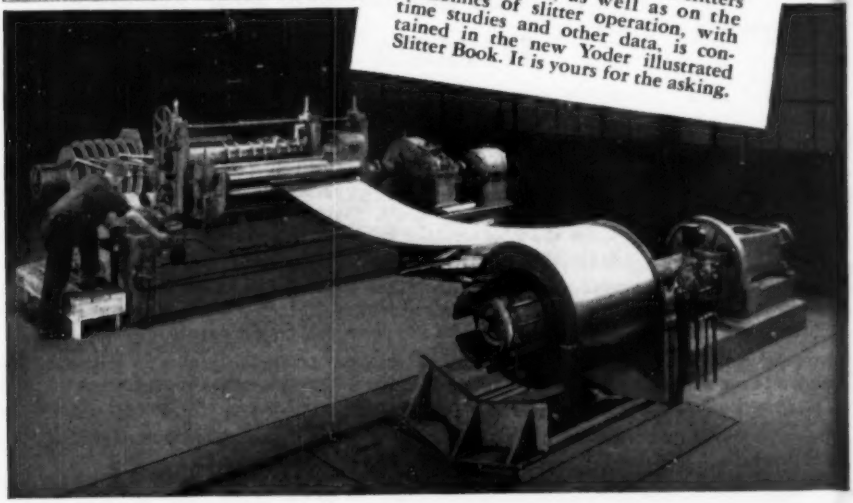

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WASHINGTON REPORT

FULL-FLEDGED BATTLE is brewing here over U. S. tariff policy. In the last 2 months, the Tariff Commission has been flooded with applications for tariff increases. Look for new legislation in Congress to hobble imports.

The administration is swimming hard against this tide of protectionism. It insists that the only way to finance the $6-billion plus annual U. S. trade surplus, without continuing foreign-aid programs indefinitely, is to encourage imports. Also, Congressional bans on imports make entirely worthless any U. S. efforts to encourage free trade and economic cooperation abroad.

Foreign traders, both importers and exporters, are lining up behind the administration to fight the protectionist offensive in Congress. Importers are directly threatened by higher tariffs. Exporters see dropping sales as the result of import curbs that further reduce slim dollar reserves abroad.

The current tariff battle started after Korea. Tough government controls on materials handicapped quite a few American manufacturers competing against firms in foreign countries whose rearmament efforts were lagging badly behind that of the U. S.

The administration resisted pressure to impose unilateral import restrictions. It argued that exclusion of products containing strategic materials from the U. S. market would merely divert them to the Soviet market. The U. S. sought to protect its manufacturers against unfair foreign competition resulting from materials shortages. They forged multilateral agreements with foreign countries to control uniformly the end uses of strategic materials.

Many foreign manufacturers, in fact, are now worse off in regard to materials than are their U. S. competitors. Example: the Cubans are complaining that the U. S. would not sell them aluminum sheet but are flooding the Cuban market with aluminum venetian blinds, pots, pans, and other such articles.

American consumer industries will get more materials, thanks to the U. S. defense stretchout. Third-quarter quotas of aluminum will be 37% greater than in the second quarter, copper quotas will rise 19%, and steel quotas 15%.

So the administration argues that demands for tariff increases no longer can be justified on grounds of raw-materials shortages. U. S. trade officials claim nine out of ten of the recent batch of applications for tariff hikes present no convincing evidence of serious injury from foreign competition or of unfair foreign trading practices. Industries howling loudest for tariff protection are the bicycle, motorcycle, sewing-machine and watch industries.

The administration claims recent requests for higher tariffs are backed by straight, old-fashioned protectionist arguments. Most demands are from industries

that have faced no serious foreign competition since 1939. Government officials insist they will have to start facing it now if the U. S. is ever to get away from government subsidization of foreign trade.

DIPLOMATIC SPARRING between East and West for control of Germany will go on for a long time. The fact is that neither Washington nor Moscow is anxious to see Germany reunited. Unification of Germany would snarl Washington's plans for integrating Western Europe. And a reunited, rearmed Germany would be a dangerous potential threat to Russia. So you can expect the diplomatic double-talking to go on.

But you cannot rule out the possibility that Stalin will offer eventually to hand back Eastern Germany on West German terms. A reunited Germany almost certainly would elect a socialistic, nationalistic government. Stalin might figure he could suck such a government into the Communist sphere.

And he would have an urgent economic motive for making the gamble—access to the industrial output of the Ruhr if he won. He needs Western industrial products desperately. The West's embargo on strategic exports to the Soviet empire is beginning to hurt badly.

Communist countries' total imports from the outside world are down one-third since 1949. Imports of raw materials and machines that the Communists need for industrial expansion and rearmament have been squeezed almost to nothing. Despite this, Soviet-bloc industrial production and rearmament have climbed sharply since 1948.

FOREIGN COUNTRIES cannot yet start adding up the amount of economic aid they will get from the U. S. next fiscal year. Congress still is being swayed back and forth by arguments for and against cutting the administration's request (see p19). But here is what the administration wants for U. S. allies:

A total of $2.36-billion to include—Britain, $590-million; France, $420-million; Greece, $145.2-million; Holland, $80-million; Turkey, $70-million; Denmark, $20-million; Italy and Trieste, $110-million; Norway, $10-million; Iceland, $1-million; Western Germany, $160-million; Yugoslavia, $78-million; Austria, $86-million; Thailand, $7-million; Indonesia, $8-million; Burma, $18-million; Philippines, $32-million; Indo China, $30-million; Formosa, $80-million.

Share of aid for Middle Eastern, African, South Asian, and Latin American countries has not been finally settled yet. But the administration has asked for $196-million of economic aid for the Middle East and Africa; $150-million for India, Pakistan, Afghanistan, Ceylon, and Nepal; $22-million worth of Point-Four aid for Latin America. Another $49-million has been requested for technical assistance and strategic-materials development in Europe.

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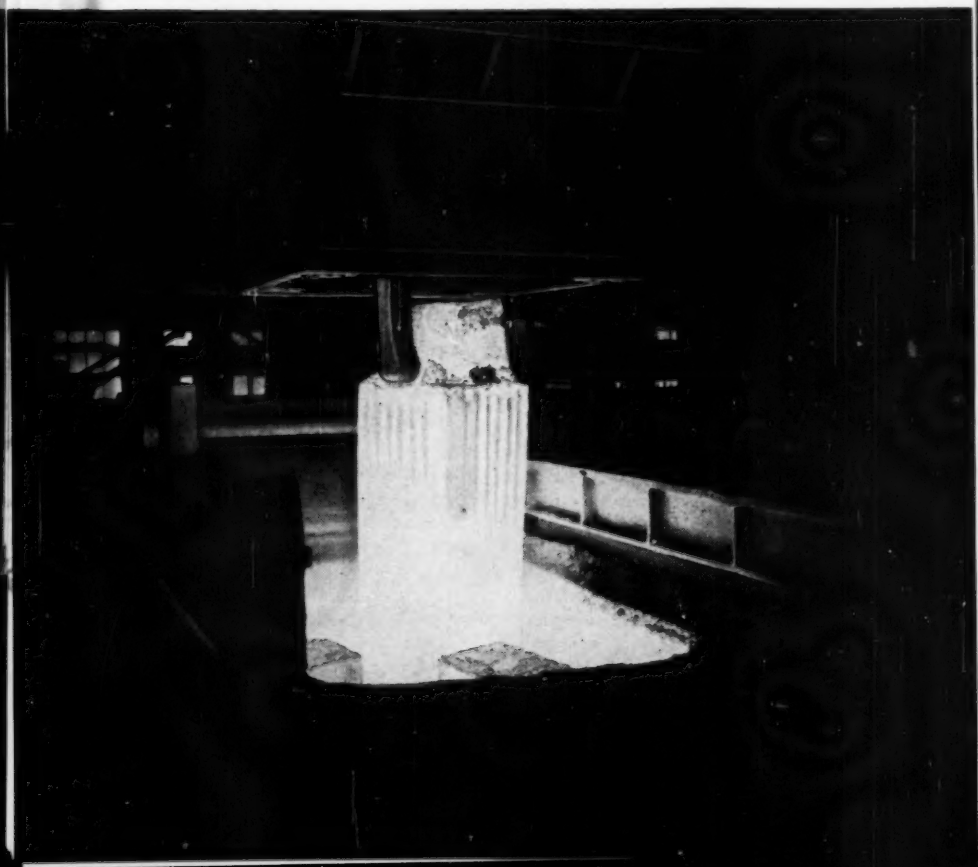

May 1952 • McGraw-Hill DIGEST • Volume 7 Number 5

Congress Battle Lines Form to Set

Future of U. S. Foreign Aid

WASHINGTON — The most important drama on the world stage today is reaching a climax on Capitol Hill this month. It is the debate in Congress on the foreign-aid bill for fiscal 1953.

Its outcome will determine the vigor and direction of American foreign policy in the critical year ahead. And it will provide the best available indication of long-term trends in U. S. foreign relations.

You will not be able to tell what Congress' verdict on the size and kind of foreign aid this year will be until the last vote is counted. Elections and the prospect of a $15-billion budget deficit have made Congress thirstier for spending cuts than ever before. But the Eisenhower boom may make many Republican congressmen shy away from heavy cuts.

A Billion or More

Best bet is that Congress will chop a little more off the foreign-aid bill than the $1.2-billion it cropped last year. The big question: Where will the brunt of the cut fall? It will not hurt too much if most comes from the billions asked for military hardware for Europe to be purchased in the U. S. But a big cut in the economic aid requested for Europe could cripple the whole Western defense effort.

Yet European economic aid is the main target of the Congressional economy drive. White-maned, cigar-chewing Tom Connally, fighting for re-election in Texas, launched the attach on economic aid. He shouted at Averell Harriman, chief administration witness, that Marshall aid was supposed to have ended last year and that, as far as he was concerned, it had ended—once and for all.

Another Name for $ Aid

Connally accused the administration of continuing the Marshall Plan under another name. He did not see, he said, why the U. S. should pay its allies to defend themselves, arguing that bolstering European economies with economic aid would mean undermining the dollar through the huge budget deficit.

The significant thing about the cries for economy this year is that they are being raised in many cases by congressmen and organizations that have backed foreign aid in the past. Connally himself was a sturdy champion of the Marshall Plan. Even the U. S. Chamber of Commerce, which backed ERP to the hilt, now wants economic aid cut out and replaced by offshore military procurement.

The administration is fighting doggedly for every dollar of its economic or "defense-support" aid request. Most government leaders agree that the economic aid is the most vital item in the whole foreign-aid program.

The administration is using these telling arguments to defend defense-support assistance:

• **Europe cannot carry** on its rearmament effort if economic aid is cut out. Western European monetary reserves have dived $2.4-billion in the last 2

years to a total of only $5.5-billion. This drain must be stopped or Europe will go broke.

The reason for the drop in European earnings is simple. Most Western European economies were just about in balance before Korea forced the rearmament speedup on the West. This almost doubled the cost of European raw-materials imports. At the same time, the volume of imports was forced up by the rearmament effort.

Meanwhile, the volume of exports was cut by diversion of resources to rearmament. The resulting trade deficit sparked speculation against European currencies, which accelerated hard-currency losses.

• **Europe cannot bring** its trade back into balance on its own without cutting rearmament. Either cutting imports or boosting exports would cut rearmament. Import restrictions cut production, including military production. This in turn reduces the tax revenues available to pay for rearmament.

Export boosts can come only at the expense of the armaments industries, which compete directly with Europe's export industries for raw materials, manpower, and plant capacity. More than 50% of Britain's total exports, for example, are machines and other metal products.

It is politically impossible to cut civilian consumption in most European countries without jettisoning their democratic regimes. Average per capita income for the Eurapean NATO countries is $418 per year.

So the administration insists that only U. S. economic aid can keep European rearmament going. Congress has been asked to give Western Europe, excluding Greece and Turkey, $1.4-billion worth of economic aid in fiscal 1953. This, the administration maintains, will buy five to six times the amount of military preparedness that it would buy if it were spent for military hardware in the U. S. Here is how:

The raw materials bought with the money will permit Europe to expand its gross national product by $5.5-billion, a 3.7% in fiscal 1953. Consumption will rise $1.1-billion because of increased employment in the armed forces and defense industries. Investment will drop $300-million. Nonmilitary government spending will rise $200-million. Military spending will rise $2.9-billion.

West European NATO members will spend $13.9-billion on defense next year if they get the full amount of economic aid requested. They will be able to lay out at most only $10.6-billion for defense without it. European output of military hardware in fiscal 1953 will be $3,596-million worth with economic aid, only $1,959-million worth without it.

These spending figures do not fully reflect the multiple effect of U. S. economic aid. Many types of military equipment can be produced more cheaply in Europe than in the U. S., and soldiers are paid much less.

A good example of how economic aid pays off is the French "Mystere" jet interceptor airplane, which is comparable to the Sabrejet. The U. S. put up $5.2-million worth of machine tools for the manufacturer of this plane. These tools will turn out 30 planes a month by the end of the year. It would cost $9-million to turn out thirty Mysteres in the U. S. So the U. S. will be getting a return each month of $9-million worth of fighting strength on an original $5.2-million investment.

• **Direct economic aid,** the administration also argues, is the only efficient way to make Europe strong enough to

get these results. Offshore procurement is no alternative because:

1. A big enough offshore procurement program to do the economic job would force the U. S. armed services to discard their strict specification requirements and just buy everything for the sake of buying.

2. It might not be possible to do buying where the economic need was greatest. Britain, for example, has almost no idle industrial capacity.

3. Offshore procurement would give the U. S. no economic lever to pry cooperation or defense out of the Europeans.

4. Payment under offshore procurement takes a long time. Europe might collapse economically before it could cash in on its contracts.

• **Political repercussions,** the administration also insists, would be much more violent from a cut in economic aid than from a cut in military assistance. It would give ammunition to the nationalists and neutralists who argue that all the U. S. wants in Europe is cannon fodder to fight its battles.

Reducing the level of economic activity could bring anti-American nationalists like DeGaulle and Schumacher to power. DeGaulle already is trying to get French business behind him by promising he would get more U. S. aid by threatening to take back U. S. rights to bases in North Africa.

• **Final argument** for continuing economic aid is that Europe will become permanently dependent on U. S. military assistance if it does not get help in strengthening its own armament industries.

Military aid and Point-Four technical assistance ($320-million in fiscal 1953) so far have not come under severe attack. Congress is behind the basic idea of building the military strength of our allies and does not mind sending them guns and tanks that it knows can be used only for that purpose.

Some congressmen have complained though about the lag in military end-item deliveries. Secretary of Defense Lovett estimates that by the end of fiscal 1953 the U. S. will have spent $11.3-billion for military end-items for its allies. If the administration's request for end-item aid for next year is approved by Congress, about $5.5-billion will remain unspent at the end of the fiscal year. Reason: It will be earmarked for long lead-time items, like tanks and aircraft, that will not yet have been delivered by year's end.

Congress still seems to like Point Four even though it has been expanded to $320-million for the next year. Only a few congressmen have attacked it so far. Their complaint is that backward territories cannot absorb that much money unless the administration abandons the self-help principle and goes in for big, wholesale commodity-aid programs.

Economic Aid Safe

That is how the battle lines have been drawn between Congress and the administration in the short-term fight over next year's foreign aid. It is now pretty certain that the administration will be able to save enough of its defense-support aid for fiscal 1953 to keep the Western rearmament program from being crippled.

But the attitudes of administration leaders and congressmen with respect to the long-range foreign policy of the U. S. are perhaps more significant than the short-term squabbling over next year's aid.

Most congressmen have indicated

clearly that they see U. S. foreign-aid and development programs as emergency measures. Congressman after congressman has asked how long the cold-war emergency is going to force the U. S. to underwrite its allies with aid. That, the administration replies, depends on Stalin's behavior, but the U. S. will have to continue aid on its present scale for at least 2 more years.

Aid May End in Few Years

Basically though, administration leaders have gone along with the majority concept of foreign aid. They hope to put Western rearmament on a maintenance basis in 2 or 3 years. At that point, they assume that our European allies will be able to pay for the upkeep of their own defense establishments. This assumes that it will be possible to return to the prewar world of sovereign nations capable of supporting and defending themselves.

Some congressmen have questioned this assumption during the debate. Their questions reflect doubts whether Stalin and the ambitions of the noncommunist peoples for a better life will permit the world's problems to be solved so easily. They have raised such questions as these:

- What have past U. S. aid programs done and what can future programs do to correct inequalities in the distribution of wealth in Europe? Congressmen asking this question have implied that the cold war for Europe between communism and democracy will go on until a fairer sharing of wealth is attained.
- What should the U. S. do to provide larger world markets for it allies? Without such markets, it is feared they will never be able to pay their own way at a politically acceptable standard of living.
- How do the Western powers propose to satisfy colonial and former colonial peoples' fierce desire for self determination? So far the U. S. has been forced by strategic necessities to give tacit backing to most of Western Europe's efforts to maintain its grip on its rebellious colonies. But the free world will not be stable until the colonial peoples' thirst for self determination is at least partially or wholly slaked—as it should be.
- What is to be done to create strength and stability in Western Europe if the present effort to build a European federation fails—as it almost certainly would if Stalin were to permit Germany to reunite and rearm? Would some kind of an Atlantic federation be the answer?
- How does the U. S. secure the markets and raw materials to maintain full employment and an expanding economy at home if and when rearmament tapers off? Will an expanded Point-Four program be necessary? Will the U. S. have to scrap its tariffs to close the dollar gap? How can U. S. private investment abroad be encouraged?

Free-World Leadership

These questions show that many congressmen feel the U. S. will not be able to cast off the responsibility of free-world leadership for decades to come—no matter how the cold war goes. They trace some of the lines that American foreign policy may follow in the years ahead.

Any American foreign policy that tackled these big problems effectively would cost the U.S. taxpayer a lot of money for an indefinite period of time. That does not mean necessarily that foreign aid would be continued in its present form. No congressman or government leader advocates indefinite aid. It does mean that the U.S. would inherit, in one form or another, Britain's former role of world banker and political umpire—and on a much larger and costlier stage.

ALGERIA—U. S. aid counterpart funds are helping to build this hydroelectric plant on the Oued (River) Agrioun near Karrata. It will supply one-fourth of Algeria's needs.

Power for the Western World

Electric Power expansion in Europe calls for 9% jump each year for total capacity in 1956 of 72-million kw. U. S. aid to power expansion already totals $1-billion.—Elec World, Feb 18, p16

AUSTRIA—Limberg Dam will be largest in Europe. It is part of Kaprun project, which will produce 600-million kw.-hr. a year—10% of Austria's total production.

TURKEY—This ECA material is going into a substation at Eregli—on way to Istanbul.

FRANCE—Rhone Valley project includes this 390,000-kw. Genissiat Dam and will supply 14-billion kw.-hr. a year. Second step will be hydro plant at Mondragon.

THE U.S. DOLLAR IN THE WORLD'S BLACK MARKETS

	Official Rate (yearend 1951)	Black Market Rate (yearend 1951)
POUND CURRENCIES *(units per U.S. $)*		
Pound Sterling	.357	.418
Australian Pound	.446	.532
Egyptian Pound	.348	.450
Irish Pound	.357	.412
Israeli Pound	.357	2.22
WESTERN EUROPE *(units per U.S. $)*		
Belgian Franc	50.00	54.00
Portuguese Escudo	28.75	29.10
French Franc	349.50	426.00
Dutch Guilder	3.80	4.23
Italian Lira	625.00	690.00
Spanish Peseta	11.00	52.00
CENTRAL AND SOUTHERN EUROPE *(units per U.S. $)*		
Swiss Franc	4.37	4.36
Austrian Schilling	14.40	33.00
Western Mark	4.20	5.13
Yugoslav Dinar	50.00	750.00
Greek Drachma	5,000.00	18,150.00
Turkish Lira	2.82	3.86
IRON CURTAIN *(units per U.S. $)*		
Eastern Mark	none	21.00
Hungarian Forint	11.74	41.50
Czech Koruna	50.00	650.00
Rumanian Leu	150.00	515.00
Bulgarian Lewa	285.00	1,150.00
Russian Ruble	4.00	25.00
Polish Zloty	4.00	25.50
ASIA *(units per U.S. $)*		
Red Chinese Dollar	22,890	38,500.00
Hongkong Dollar	5.71	6.70
Indian Rupee	4.76	5.90
Taiwan Dollar	15.55	26.75
Pakistan Rupee	3.31	5.30
Philippine Peso	2.34	2.91
Iranian Rial	32.25	66.50
Indonesian Rupiah	7.56	17.00
Straits Dollar	3.06	3.65
Japanese Yen	360.00	432.50

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TABLE forms part of a new hand book that serves as a guide to world . . .

Black Markets in Currencies

Book just published reports on black-market value of world currencies; Swiss franc, Portuguese escudo are soundest

SINCE WORLD WAR II the legal values of a great many currencies have had little to do with the values that people give them. As a result, despite what the law says, plenty of people have been ready to exchange these currencies at a discount to get other currencies—or precious metals—that they consider "safer".

A world-wide network of currency black markets has developed. Some of the transactions in them are flatly illegal, others border on legality.

An unusual business handbook comments on the black-market value of a nation's money—the *1951 Black Market Yearbook* (Pick's World Currency Re-

port; New York City; $1.25). The BMY graphs the rise and fall of the world's currencies during the postwar years and reports on black-market conditions all over the world. It gives black-market values for foreign currencies in terms of the U.S. dollar.

The Yearbook's compiler is Franz Pick, a Czech economist who puts out a weekly bulletin on currencies and precious minerals. He gets information on black-market prices from correspondents in such well-known centers as Tangier, Paris, Zurich, Vienna, Istanbul, Bombay, and Hong Kong, plus some lesser-known ones such as Beyrouth, Jidda, and Macao.

Pick is also something of a prophet. He predicted the Wall Street 1929 crash (3 months in advance), the 1931 devaluation of the pound sterling (2 months in advance), and the 1933 devaluation of the U. S. dollar. His latest comes out of the recent NATO meeting at Lisbon. He said that British Foreign Minister Anthony Eden and his French counterpart, Robert Schuman, had suggested that the U. S. devalue its dollar by raising the price of gold from $35 an ounce to $50 and use the $1-billion "revalorization profit" that would result to bolster the pound sterling and franc.

Pick says he does not expect Secretary of the U. S. Treasury Snyder to take kindly to this suggestion. Hence, he predicts that the pound and franc will be forced to devalue once more before the end of this year, causing a "monetary earthquake" that will finally lead to devaluation of the dollar to $50 an ounce in 1953.

Pick's Cure for Inflation

Pick also has a cure for inflation. It is the same that Camille Gutt carried out in Belgium after World War II—a drastic dose of deflation through government action. He points out that the Belgian franc is one of the strongest in Europe.

Even stronger, he says, is the Portuguese escudo, "practically free and backed by adequate gold coverage." He consider the escudo as well as the Canadian dollar, one of the best bets as a hoarding unit.

How Money Changes Hands

There are various ways for currency and precious minerals to slip across borders. Obviously, smuggling is one way. Another method is more subtle. Suppose an Englishman traveling abroad wants to get his pounds out of Great Britain. Legally, he can bring only a small amount out of the country. But once he is abroad, he can buy U. S. dollars or escudos or whatever he wants from a black-market dealer. In payment, he transfers pounds from h's bank account back in Britain to the account of a British correspondent of the dealer abroad.

Pick classifies five different varieties of pound sterling:

- Commercial sterling, balances resulting from legitimate international trade, and transferred between countries at the legal rate of $2.80.
- The switch pound, whereby foreigners are legally permitted to buy British securities at a discount (about $2.35 at yearend).
- Residential sterling, the type used in illegal transactions like those of the traveler mentioned above.
- Diamond sterling, so-called because it is used mainly to pay for illegal diamond shipments from Great Britain. This kind of sterling doesn't go through banks, whose foreign exchange operations are controlled. It comes to the British seller from the foreign buyer through the buyer's British agent.
- Banknote sterling is pocket money arriving from abroad. There is much more of a market for it, Pick says, in North Africa and the Near East than in New York.—Business Wk, Mar 22, p118

GARDEN APARTMENTS feature 2-bedroom factory-assembled duplexes.—p86

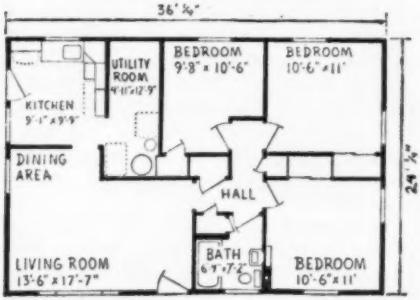
PREFABRICATED housing lends itself to fast construction of mass-housing.—p96

Prefab Houses Draw Workers

With materials restricted and costs high, the need for low-cost housing remains as high as ever. Expanding production calls for more workers. But workers cannot be successfully attracted to an industry unless adequate housing is provided. Factory-built housing may fill the need. The practicality of the prefabrication idea has been demonstrated. Now the industry will concentrate on getting more efficiency out of its methods. Shown here are samples of prefabricated housing as built in various sections of the U. S.—Am Builder, Mar

KITCHENS in most houses are large, well designed; contain latest appliances.—p99

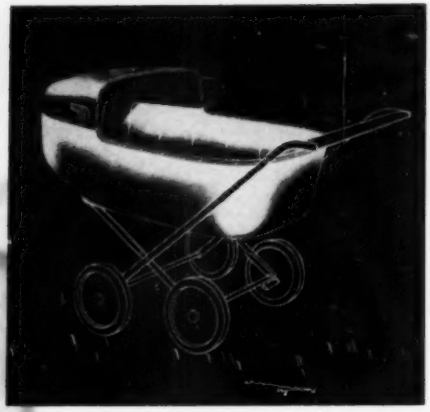
FEATURES of this house make it ideal for narrow lots. It has two bedrooms.—p95



PLANS of Harnischfeger houses show layout. House comes 83% complete.—p89

PARTS come from factory ready to be erected at site. Little is wasted.—p93

TWO-BEDROOM house by Harnischfeger Corp. is built on slab foundation.—p89



FOR BABIES, molded plastic baby carriage would be sanitary, would not chip or scratch. Compact folding chair has seat and back of molded plastics.

Plastics Look at their Future

Plastics are here to stay and future applications appear to be unlimited. Imagination and confidence can open up new markets

ONE FINE DAY in the 1960's, Mr. Average Consumer hopped out of his plastic bed, in his plastic-paneled home. Soon he was singing in his plastic-piped shower, then eating a plastic-cooked breakfast. Fed, he dashed for his hardtop convertible—with plastic top, of course—and headed for the nearby city where the plastic-roofed stadium was ready for 100,000 plastic-clad sports fans.

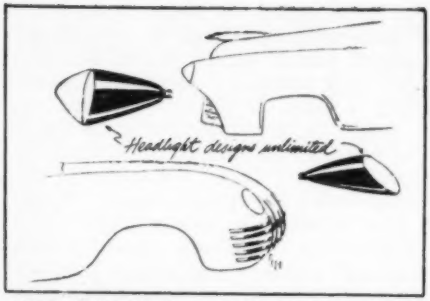
That is a quick glance at the world of not so long from now. The plastics industry, between 1934 and 1950, jumped from 100-million-lb. annual production to 2.2-billion lb. That skyrocketing is nothing compared to what is coming.

Also, in the past, is the use of plastics as a fad or as a mere substitute for something that is scarce. From now on, plastics will be carving a place in their own right, will find applications because they are just plain better than the materials they replace.

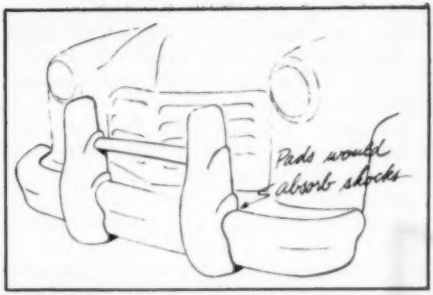
Chemists predict that the properties of many present plastics will change, too. Plastics will get stronger, more resistant to temperature changes; methods of production will improve. After that, many researchers and designers say, is the job of showing top management what plastics can do and why they should replace tried and proved materials.

• **Automobiles**—Playing a large part in the plastics story is the automobile. Designers, already thinking about reinforced plastics for "hardtop" convertibles, are dabbling with the idea of plastic doors, fenders, and hoods—if and when a strong enough plastic is avail-

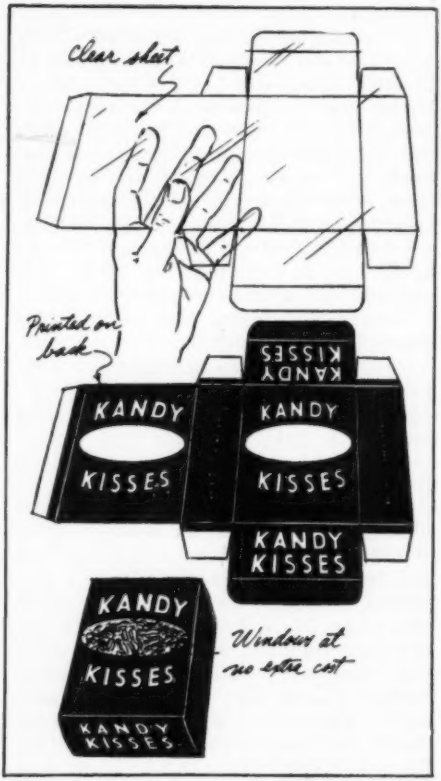
For more of plastics' future, please turn to page 28.



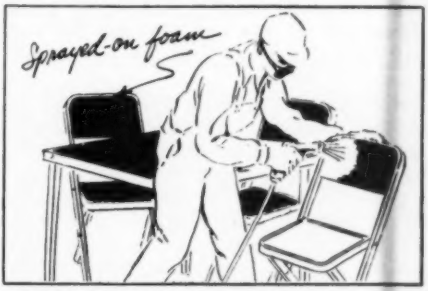
AUTO HEADLIGHTS could be pointed or flat to blend with over-all design.



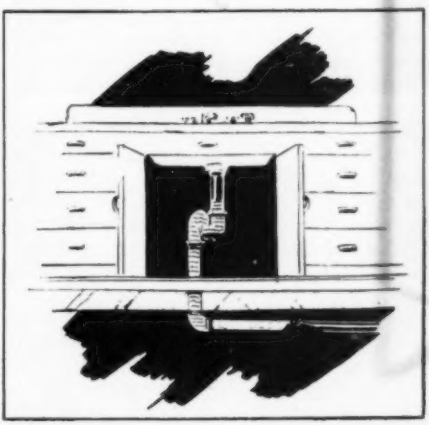
AUTO BUMPERS, made of colorful vinyl, may do away with expensive chromium.



FOLDING CARTON made of plastic sheet is printed on inside for depth of appearance.



SPRAYED-ON vinyl foam could make low-cost tables and chairs more comfortable.



PLASTIC PIPING, easier to install than metal, may someday be less expensive.

able. Colors are "built in" the plastic, never need refinishing, and clean with a damp sponge, also made of plastic. And the bodies would not corrode and rust like metal.

Already, plastics like acrylics are found in tail lights. Engineers say there is no reason why headlights too cannot be made of it. Then the designers could mold the headlights as they like. If a tail light looked like a tail of an airplane, the headlights and grill work could be molded to look like its nose. Unbreakable plastic windows would reduce glare and the sun's heat. Plated plastics may yet push chromium off the car. Inside, the car will be upholstered and insulated with plastic materials.

• **Pipes**—In industry, plastic pipe is already widely accepted. Oil fields are laying more and more cellulose acetate butyrate pipe. Mines install polyethylene pipe because it resists corrosion. Tests have already started with plastic pipe for radiant heating. Future houses may be equipped with flexible water and gas pipes. With them, rooms could be rearranged, and walls moved, without upsetting the plumbing.

In home appliances, plastic housings and jackets will probably be made where strength is not of primary concern. Radios are already almost exclusively plastic-covered. Once a smooth heat-resistant plastic is perfected, stoves, washers, and ironers will be finished with these shells. And there are a lot of changes ahead for refrigerators. Designers claim that it will be possible to mold the entire inside shell in one piece, complete with shelves.

• **Architecture**—When it comes to really eye-opening new uses for plastics, architectural developments may steal the show. Take gutter pipe. Gutters are mass-produced from galvanized metals. They often rust through; when they get clogged up, you have to pull the whole works down to find what is wrong. A transparent colored plastic gutter would be rustproof and retain its good looks indefinitely. When it became clogged up, it would be an easy matter to locate the trouble. In fact, trouble spotting would be easy if all plumbing in the house were made from transparent pipe.

One architect suggests plastic wall panels, with a colored finish on one side and plastic foam sprayed on the back as insulation. He says the same panel, with tiny holes punched in its face, would make excellent acoustical ceilings.

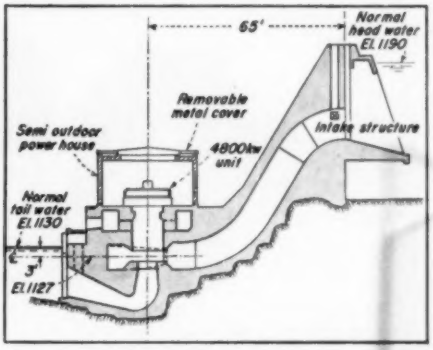
• **Furniture**—In the finishings field, all sinks and counters can be made of molded laminates. "Contour-fitting" chairs made of plastic shells have wide acceptance in the home. For the standard upholstered chair, all sorts of possibilities arise. Vinyl foam sprayed over a metal frame would eliminate the necessity for springs and stuffing —a onepiece foam covering can be molded to look just like a fabric. No springs, no seams, no sewing, and it is quick to make, are advantages claimed by the designer.

Other applications are limitless: suggested are modular children's furniture that can be expanded as the child grows. A baby carriage that cannot be scratched and will always be bright and colorful is mentioned.

Probably the most fantastic idea is a design for a stadium seating up to 100,000 people. The stadium has a roof for bad weather made out of 24 pie-shaped segments of reinforced plastic. The segments are counterbalanced for easy raising and lowering, and they are equipped with radiant heating (using plastic pipe, of course) to melt snow. The plastic is translucent so the "hall" is filled with light during the day; at night, inside lights would give out a rosy glow visible for miles.—Mod Plastics, Mar, p93

This Month's How To . . .

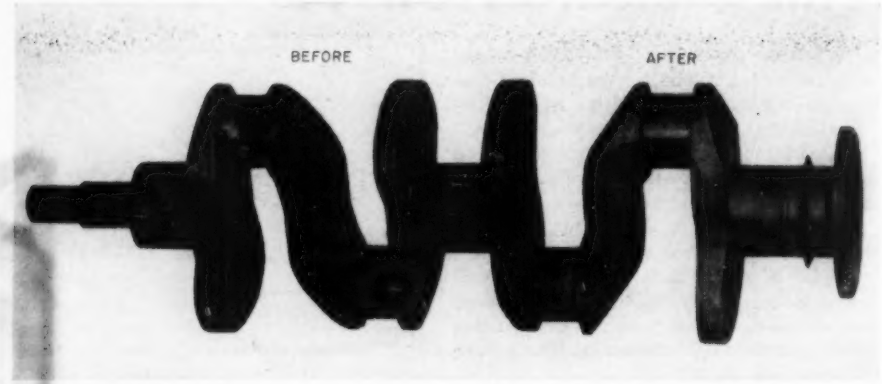
. . . **reduce cavitation** of a water wheel is a technical problem attacked by Wisconsin-Michigan Power Co. Studies indicated that, at the Lower Michigamme Falls Plant, cavitation developing with the 60-ft. head would be reduced to a minimum if the water wheel were placed 3 ft. below the tail-race water level. Maintenance work on the wheel will be more difficult. Stop logs will have to be put in to block off tail-race water while repairs are made. But maintenance itself should be less.—Elec World, Feb 18, p28



. . . **speed up assembly** is shown by merry-go-round unit at Potter Instrument Co. Plug-in electronic counter units are assembled seven at a time. Mating sockets for plug-in terminals are mounted on wood strips hinged to turntable to serve as holding fixtures for chassis units and still allow turning chassis units over for work on opposite side. Projecting shaft of turntable makes convenient holder for solder and wire spools. Same work is done on each chassis in turn to gain advantages of speed and accuracy.—Electronics, Mar. p256

. . . **break concrete** without blasting is easy with K. O. Duncan Co.'s Roc-Jak. Pictured is 7 x 9-ft. concrete block removed by a pair of Roc-Jaks. In operation, one or more holes are drilled 2 ft. deep and 3½ in. in dia. The Jak is then inserted in the hole with an equalizing shim or feather, and the hand-operated pump attached for pressure. After the slack is taken up, additional travel of ⅛ to ¼ in. is sufficient to cause the break. Within 2 min., operating pressure of 150 tons is developed. Original break can be enlarged with two Roc-Jaks.—Const Meth & Equip, Mar, p125

How Electrolytic Process Removes Rust



STEEL CRANKSHAFT shows effect of derusting with new electrolytic process developed by Enthone Corp. Process, using alkaline bath instead of usual acid pickle, cleans steel, cast iron, malleable iron, and other iron alloys without subsequent rusting. Corroded piece is made the cathode. Treatment time is from few seconds to several minutes, depending on surface condition and current density (from 5 to several hundred amp. per sq. ft.). Prod Eng, Feb, p196

Spectrophotometer Cuts Wool-Blending Costs

In working out the practical applications of color measurement, Alexander Smith, Inc., first controls the color of the raw materials going into the dyeing process.

The steps in the procedure are:

1. By means of a spectrophotometer, dyestuff samples of shipments from various suppliers are tested.

2. The firm implements its wool-blend color-control program first by obtaining a match to any chosen standard shade.

3. The color of the various wool types that make up the blend must be known. Samples are taken from the wool bales and sent to the laboratory. Here the sample is scoured; its reflectance curve is obtained through spectrophotometric measurement.

4. Through spectrophotometric data, the least expensive blends for the shades needed are made.

Calculation of blends by this technique has yielded a decrease of approximately 10% in the cost of the wool blend going to the dyehouse.—Textile World, Mar, p155

Indicates Coal Level

Spring suspending a vibrating feeder at a mine of United Pocahontas Coal Co. serves as part of a weighing device for operating a dual-purpose signal. Signal indicates, first, whether there is coal in the hopper, and, later, when the hopper is about empty.

Compression and expansion of the feeder's suspension spring operate a micro switch. A lever multiples movement of the spring so that the switch will work properly. A 60-watt lamp acts as an indicator and is visible to the operator 750 ft. away.—Coal Age, Mar, p106

British Speed Up Work on All-Plastic Delta Wing

All-plastic molded wing developed by British scientists is on display at the British Industries Fair. Data on design and construction of the delta wing have been released.

Basic material is asbestos fiber bonded by a resin; large, soft sheets that resemble felt are the result. Alternative materials for experimentation were fibers of cellulose, paper, and glass.

One molding technique is simple; the sheets are saturated with warm water and rolled by hand over a wood or plaster shape. The resin locks the fibers in place, and the whole assembly is cured in an oven. For more complete structures, the rubber-bag process is used.—Aviation Wk, Mar 17, p26

New Churned Margarine

Revolutionary process turns out a margarine with body characteristics like those of butter. The process, developed by Armour & Co., produces the margarine labeled Cloverbloom 99.

It uses the same fats and oils as in conventional margarine making. These are warmed to slightly above their melting points and mixed in an agitated vat with either skim or whole milk. The mixture is then formed into an emulsion by pumping it into a vessel and exposing it to jets of live steam. The steam also physically alters the milk proteins so they can orient themselves on the surfaces of the globules, as in the case of butter.

The emulsion is flashed as a fog-like mist into a chamber under partial vacuum to complete globule dispersion. The emulsion is cooled, culture is added, and finally the emulsion is churned as in making butter.—Food Eng, Feb, p111

Clothespins Spot Trouble

When an operator on the moving-belt television assembly line at Emerson Radio & Phonographic Corp. cannot finish her work on time, she clips a colored, numbered plastic clothespin to the chassis, directly over the defect.

The color of the pin and the number on it tell the repairman farther down the line where the trouble should be. After he finishes the work, he removes the pin.

Typical causes of not being able to finish the work on time are broken terminals or trouble with a joint. As the operator catches the defects herself and they are generally not her fault, no records are kept of clothespin defects.—Electronics, Mar, p292

EUROPEAN GLOSS ON A U. S. CAR

Nash Kelvinator Corp. has brought European design to a regular line of American cars with the introduction of its 1952 Ambassador super and custom series. Besides the body design by the Italian, Pinin Farina, the cars offer a variety of new mechanical developments.—Business Wk, Mar 15, p23

Construction Trends in 1951

Trends and techniques developed last year point the way toward better use of materials and manpower, better roads, and more water

AGAIN IN 1951, construction volume broke all U. S. records. Out of this huge volume have come many significant trends and new techniques. What follows is an editorial survey of some of the more outstanding developments of 1951.

Buildings and Housing

Buildings containing prestressed members have now been completed in four states. Last year saw the first application in the U. S. of fully prestressed concrete to beams and girders in buildings.

A new building-foundation technique was tried. To prevent excessive settlement of a hospital in New Orleans, engineers designed a combination floating and pile foundation. Excavation was made as deep as possible to reduce net load. Wood or cast-in-place concrete piles were driven into a sand layer, and a mat foundation was substituted for pile caps. The trend toward precast-concrete curtain walls turned into a positive shift away from masonry. Placed in large sections—8 ft. high and 8 to 25 ft. long—the precast panels are proving lower in cost than brick.

A trend toward air conditioning of new office buildings has been noted for a long time. But last year, it became evident that many of the large, older structures were also being equipped with air conditioning to meet competition.

A new lighting technique appeared in 1951. Slimline fluorescent lamps operating on 360 cycles were installed. Benefits are reported to be significant. More light is produced for the amount of current required, and tiny capacitors are substituted for conventional ballasts.

Transportation

Toll-road construction and planning rose to new levels during 1951. Competition between the asphalt and cement interests continued. As a result, some roads were paved with concrete, others with asphalt. But no definite conclusions were made on the superiority of one over the other.

One toll road included in its planning a proposal to reverse the position of the traffic lanes. This was advanced as a safety measure and to obtain certain advantages that could be gained by placing service facilities in a mall between lanes. The proposal was considered but not adopted.

Better airfield pavements are the subject of much research. Bituminous pavements better able to resist the shearing forces set up when a heavy plane lands is one objective. Subject of another study is the effects of fuel spillage and heat from jet aircraft.

Prestressed concrete for bridges got a boost in 1951. A total of 26 were built. In general, U. S. engineers preferred to anchor the prestressing steel at the ends of their beams rather than rely on bond for anchorage. However, there was a definite trend toward grouting the steel in after the prestressing operation.

Water Supply and Sanitation

Fluoridation of water supplies—a means of preventing tooth decay in children—is now just a matter of time. The Kingston-Newburg test has been

declared a success by the N. Y. State Health Dept. after but half of its intended 10-year duration. In the U. S., cities practicing fluoridation of water supplies now total nearly 130.

An important study got underway in 1951. Its object was to determine just what are safe limits for the many other elements possibly found in water supplies. The project will attempt to establish a physiological basis for limits on trace amounts of cyanide, chlorides, and phenols that can be safely consumed by the human body.

A process successful in concentrating undigested sewage sludge to 20% solids was developed. The controlled-heat, controlled-time sludge flotation process will be designed into treatment plant with facilities to burn the concentrated sludge directly, without digestion or filtering.—Eng News-Rec, Feb 14, p31

Product Design Briefs

▶ **Vandium** with 99.8% purity is made by calcium reduction of vanadium trioxide. Studies at Union Carbide & Carbon Corp. show that it can be hot-worked into ductile wire or sheet. Properties: salt-water resistance, high elastic modulus, little magnetic susceptibility.

▶ **Aluminum-base** casting alloy with stabilized physical properties is made by adding less than ½% of titanium and manganese to alloys containing 3 to 8% magnesium. Acme Aluminum Alloys, Inc., holds the patent.

▶ **Better permanent magnets,** General Electric Co. reports, may be made using a metal chill at one end of cavity to cause long crystals to form.

▶ **Tiny thermostat** made by Thomas Edison, Inc., is smaller than a paper clip. Temperature range is −50° to 350°F. It should find wide use as heat control in crystal ovens, hot plates, heating pads.—Prod Eng, Mar, p7

WATCH THE JUSTICIALISTAS GO BY

This sedan is Argentina's first home-grown automobile. Named for Peron's political ideology, "justicialism", it is scheduled to be introduced in June. Aerotechnic Institute, government airplane maker, promises that pratically all parts will be locally produced, that 5,000 cars will be built in the first year. It is 13 ft. long, with a 23-hp., 2-cyl. engine. Best guess on price is 30,000 pesos, about $3,000.—Business Wk, Feb 16, p190

Provides Heat at Low Cost

Comparatively low operation and maintenance costs, reasonable first cost; those are the chief advantages of Armour & Co.'s new heating system. Requirements were (1) hot air up to 300° F. for a 1130-ft. long dryer, (2) low-pressure steam for existing space-heating system, (3) hot water.

After some study, the firm concluded that a high-temperature hot-water system could best serve the process and space-heating needs of its plant. It offered the following advantages:

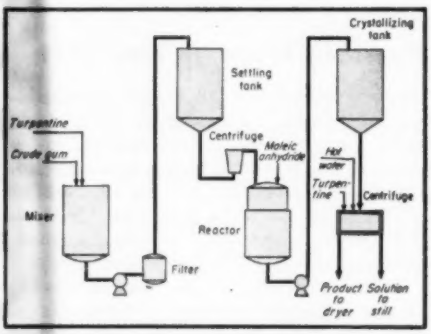
- Simple installation and operation.
- Small-diameter piping and elimination of pressure-reducing valves.
- Simple and flexible temperature regulation.
- High fuel economy.
- Equal distribution of heat.—Factory, Mar, p126

TECHNICAL SHORTS

Plastic House—First plastic home built in California costs $5.02 a sq. ft. Chief economies lie in wall and roof construction. Two-inch-thick laminated vermiculite asbestos panels form walls and roof. —Am Builder, Feb, p215

Twist Contraction—Do not ignore twist contraction in figuring spinning production. It causes loss in actual spinning production compared with estimated hank-clock production. Loss is proportional to twist multiplier used. Allowance made for contraction gives better figures. —Textile World, Mar, p163

New Shaped Charge—A way has been found to divide the stream of force from a shaped charge into a series of jets that break rock fragments or boulders without throwing pieces in the air. Shaped Charge Explosive Mgs., Inc. will make the charge. —Eng & Min J, Mar, p102



NEW ACID FROM PINE GUM

Pilot-scale operation at the Dept. of Agriculture's Southern Regional Research Laboratory indicates commercial possibility of making maleo-pimaric acid from crude pine gum. Gum and turpentine are mixed, filtered, settled, and centrifuged to remove water. Cleaned gum is reacted with maleic anhydride. Maleo-pimaric acid crystallizes out. In printing inks, the acid produces brilliant, workable azo pigments.—Chem Eng, Feb, p199

Roadside Batch Plant—When Ray F. Yount Co. was awarded a contract to modernize 10 mi. of highway, it figured that a regular stationary batch plant would be too expensive for the job. So a portable batch plant was set up. Aggregate and cement are trucked to plant, batched, and loaded by a portable belt loader into transit mixer for mixing.—Const Meth & Equip, Mar, p69

Shaft Handler—National Supply Co. has devised for its own use a drop-proof lifter for heavy shafts. Short piece of large-diameter pipe with welded-on hook and handle is placed over each end of shaft. Crane chains attach to hooks.—Weld Eng, Mar, p55

Corrosion Prevented—When copper leads are connected to aluminum conductors, galvanic corrosion can be prevented by: (1) varnishing or lacquering welded joint to exclude moisture, (2) ultrasonic welding, (3) percussive electrical welding, and (4) silverplating the joint.—Elec C&M, Feb, p176

New Milk Canning Process—Fresh whole milk can be canned by a process developed at Colorado A. & M. College. The key is to add edible hydrogen peroxide that destroys heat-resistant bacteria and is then neutralized by milk enzyme.—Business Wk, Feb 23, p54

Main Cause of Plant Fires—Faulty electrical wiring and equipment cause most industrial plant fires. Temporary wiring should be avoided. If wiring must be temporary, be sure and make it permanent the next day.—Factory, Feb, p144

Oil Pumping—New hydraulic pumping system keeps power oil separate from produced crude oil. Developed by Richfield Oil Corp., it is triple-string unit that loses daily only 2% of power oil.—Oil & Gas J, Feb 11, p82

Better Sound—Quality of sound may improve with loudspeaker, called the Ionophone, developed by Frenchman Siegfried Klein. It replaces mechanical diaphragm with a platinum electrode. When heated, electrode produces ionic cloud that responds to electric-field strength and expands and contracts to produce sound waves.—Prod Eng, Mar, p194

Monitors A-blasts—Radiation monitoring system for atomic-bomb blasts has been set up in U. S. One result: radiation reaching New York City from explosions 2,000 miles away in Nevada was found to amount for 24-hr. period to 1/300th of that used for average chest X-ray.—Electronics, Feb, p22

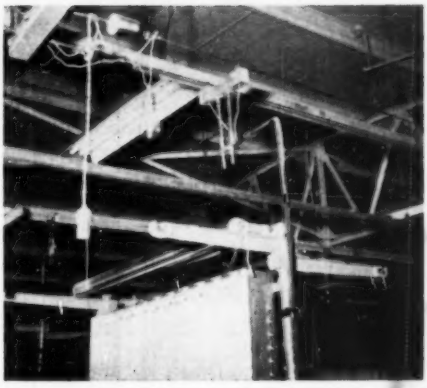
How To Control Hail—South African farmers are converting crop-destroying hail storms into harmless rain by cloud seeding with rockets carrying chemicals. Good results have been reported.—Chem Wk, Jan 26, p15

Machine Palletized—H. A. Johnson Co. permanently mounted its seldom used, manually controlled closing machine on a pallet. Machine can now be placed by fork truck in a production line in a matter of minutes and with almost no labor. —Food Eng, Mar, p9

Long-life Bearing—New Moraine-400 bearing has steel backing clad with cadmium-silicon-aluminum alloy overlaid with tin-copper high-lead babbit. It outlasted three crankshafts and blocks in test engine.—Am Mach, Feb 4, p79

Diesel Costs—Cost study made by Mississippi River firm of diesel-driven ships compared to steam-turbine reduction-gear drive showed yearly saving of $25,605.—Power, Mar, p113

Machines Compile Data—Statistical Tabulating Co. has installed two International Business Machine electronic machines that sort and count tabulating cards at the rate of 450 per min., cross tabulate them automatically, and print totals. All this is done in one operation. —Am Business, Jan, p22



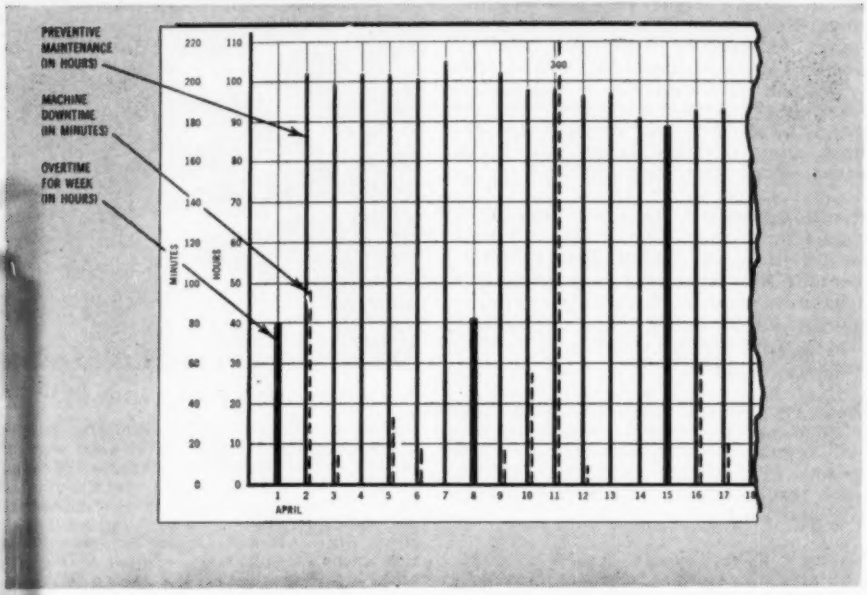
WIRES IMPROVE LAYING-OUT

Laying-out operators at William Carter Co. experienced trouble in smooth motion of the fabric-spreading machine because of jerky conditions in the electric-trolley race. To give freer operation of the laying-out machine, two exposed copper trolley wires were installed. A wooden base holds two carbon brushes on a steel frame attached to the side of the laying-out machine. Carbon brushes now move smoothly under the wire and provide good electrical contact.—Textile World, Mar, p194

Hush-hush Job—Unusually thick security blanket has been thrown over new military vehicle to be built by General Motors-Holden, Ltd., Australia. It is supposed to be in a class somewhere between the Jeep and the Blitz Buggy. It will be GM's third original Australian model. —Mach, Jan 26, p140

Lower Ingot Cost—Stainless steel can be made cheaper by substituting low-carbon ferro-chrome-silicon for low-carbon ferrochrome. About 7 to 8¢ are saved for each pound of chromium added to the charge.—Iron Age, Feb 21, p108

Plans Use of Plastic Pipe—U. S. Navy will replace copper-nickel piping on several minesweepers with plastic pipe. Cost is less; repairs are simple. Pipe consists of fiberglass cloth impregnated with resin.—Marine Eng, Mar, p85



TIME CHART spots trends so trouble can be prevented before it develops

Two Reports Halve Downtime

A record that is easy to keep and a graph that is easy to read help foundry cut downtime from electrical breakdown in half

TWO VISUAL REPORTS—a chart and a graph—make it possible for the Lynchburg Foundry Co. to get the most out of its electrical maintenance program. Preventive maintenance allows the company plenty of time to do a good job. That means keeping production going, and keeping equipment in good repair, at lowest cost.

Lynchburg Foundry knows that a preventive maintenance setup must be flexible. So inspection and servicing schedules change to fit the company's needs. Equipment performance is noted over a long period. Trouble is spotted before it develops. And breakdowns are studied—where they occur and why. All these steps are necessary to cut machine downtime and keep it to a minimum.

Lynchburg Foundry's two visual reports help do these things. Benefits of such a flexible preventive maintenance program have been big. The reports look like this:

Master Record—This is the monthly report of (1) minutes of machine downtime because of electrical maintenance, (2) number of hours worked by electricians for each day of an entire month.

Date headings run across the top. Down the left side, in the first section, are the names of the machines, in the second section the names of plant departments.

The upper (downtime) section has 33 subdivisions, covering all production and accessory machinery. The lower (hours worked) section shows the 13 departmental or functional subdivisions to which maintenance is charged. This form records all construction and preventive maintenance work. The total man-hours of this section are the total hours worked at straight time by all the electricians.

A maintenance clerk posts data daily to the master record. He gets his information from an analysis of job tickets. For machine downtime, the job ticket shows machine name, location, cause of trouble, what was done, and what new parts were used. Time "in" and "out" is stamped by a timeclock. The tickets are then filed chronologically.

Time Chart—This is the second visual report, covering a 3-month period. Purpose of this chart is to give a quick picture of important trends that need to be watched.

The chart shows a set of three colored time graphs for each day showing: (1) downtime in minutes (dotted line); (2) labor on preventive maintenance in hours (thin line); and (3) overtime in hours (heavy line). The maintenance clerk extends the graphs each week.

How They Work—Assume that the time chart on a certain day shows an unusual amount of downtime. The master record will show which machines are responsible for this downtime. Then job tickets for the machines are studied to see what was wrong, what parts failed, and so on. The possibilities for diagnosis are wide. And the chart will help guide the way to the right diagnosis.—Factory, Mar, p110

Lower Alloys Developed for High Temperatures

Low-alloy steels originally developed for high-temperature bolt applications have been modified for use up to 1100° F. This will make them useful for jet-engine parts in air-cooled designs.

Principal advantage of these steels is that they need little or none of the critical alloying elements— columbium, cobalt, tungsten, nickel. Instead, the high-temperature strength is obtained by heat treatment. Furthermore, they are malleable in all ordinary hot-working methods.

One such steel has 0.20% carbon, 0.60% silicon, 1.35% chromium, 0.50% molybdenum, and 0.80% vanadium. Its 1,000-hr. rupture strength in 1100° F. is from 35,000 to 37,000 psi. Heat treatment consists in normalizing from 1800° F. and tempering to 323–327 Brinell.

If a still higher rupture strength at 1100° F. is required, 12% chromium steels when alloyed with columbium show strengths up to 46,000 psi. at 302 Brinell.—Iron Age, Feb 21, p98

Flexible Shaft Handbook

S. S. White Industrial Division is offering the Third Edition of the S. S. White Flexible Shaft Handbook. This 256-page manual provides a reference on the use of flexible shafts in transmitting power and remote control. It includes details on construction, selection, and application. For your copy, write on your company letterhead to S. S. White Dental Mfg. Co., Industrial Division, 10 East 40th Street, New York 16, N. Y. For other free technical literature and catalogs, turn to page 65.

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Dow is the source for a wide range of solvents. Due to their ability to quickly dissolve greases, fats and waxes, Dow chlorinated solvents are in wide demand in the metal working industries. In addition to chlorinated types, many other Dow chemicals have noteworthy solvent power. Among them are Dowanol glycol ethers, glycols, polyglycols and alkanolamines.

fumigants

Dow soil and grain fumigants are helping to grow and protect much-needed foodstuffs for the world's population. Dow soil fumigants control weed seeds, nematodes, wireworms and other root attacking parasites so that greater crop yields result. Grain fumigants protect grain, flour and other food in storage or in transit from the destructive attacks of insects and rodents.

plastics

Styron (Dow polystyrene) is a thermoplastic material increasingly used by manufacturers to bring added sales appeal and low production costs to such items as lighting fixtures, radio cabinets, and electric refrigerator parts. Other Dow plastics include: Ethocel (Dow ethylcellulose) a tough plastic that combines lightness with good shock resistance; Saran for extruding and weaving into seat covers, screens; Saran film used for packaging.

agricultural chemicals

A recognized leader in agricultural chemicals, Dow manufactures both basic ingredients and formulations that help farmers raise more and better crops and livestock. The Dow line includes: weed and grass killers, insecticides, fungicides, soil and grain fumigants, plant growth regulators, veterinary chemicals and wood preservatives. Dow's technical staff develops new farm chemicals and thoroughly tests every product before offering it to the user.

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THIS MODERN JET AIRPLANE can go places at speeds undreamed of in the days of the first engines. But today's engines show accepted theories wrong, pointing to how . . .

New Heat Ideas Are Needed

New revolutionary idea in thermodynamics refutes commonly accepted concepts, presents new ones to bring theory into line with practice

INVENTORS of the first steam engines knew that heating water would expand it and drive off steam—and that steam could be turned into energy. And as scientists began to study the action of these engines to see what would happen if they varied pressure and temperature of the steam, they developed basic formulas that became the theory of thermodynamics.

Ever since then, engineers have been applying the theory to everything from steam engines and turbines to internal combustion engines, gas turbines, compressors, air-conditioning and refrigeration equipment.

But sometimes, experimental results have not matched theoretical predictions. So the blame was put on experimental and instrumental errors.

Now, however, one scientist says it isn't so. Professor Neil P. Bailey of Rensselaer Polytechnic Institute has questioned the accepted concepts of thermodynamics. He says that the time-honored formulas are wrong, that they have been causing the trouble.

They have caused even more trouble as better performance and greater power have been demanded from engines. Temperatures, pressures, and flows have been increased. And the gap between results and predictions has widened.

In other fields too, the accepted the-

ories have not answered all the questions put to them. The same problem existed in aerodynamics and hydraulics. Airflow patterns over wings of high-speed jet airplanes do not correspond to the old theory. And under high pressures, hydraulic pumps and nozzles run into unstable flow conditions not predicted by the accepted theory.

New Theory vs. Old

Bailey's findings may bring all these variables into line. He believes that the standard general-energy equation is wrong. According to this long-established theory, the total energy of a pound of a flowing substance remains constant and that constant total is composed of four parts:

1. Potential energy.
2. Kinetic energy of the moving mass.
3. Internal energy of the dancing molecules.
4. Pressure times specific volume—the energy stored in a fluid under pressure.

Bailey concludes that item 1, potential energy, is an illusion. Liquids in elevated positions, he believes, neither know nor care where they are and that they have no energy but receive it only as they move downhill under the force of gravity. If they never move, they will never have this energy.

This contrasts with true potential energy of a compressed spring that does have internally stored energy from elastic stress forces having moved through deformation distances.

Also, Bailey holds that item 4 merely defines a state and does not represent energy. Internal energy, item 3, is the total energy in the substance, so adding item 4 would be crediting the substance with more energy that it actually possesses.

Another point that Bailey makes is that fluids flowing in unconfined space, as air flowing over an airplane wing, does not conform to the laws of flow through pipes, on which basic theory was founded.

Result of Bailey's work is his theory that the total energy of a substance as it flows past any point is the same as at any other point and consists of:

- Internal energy in pounds that pass the given point in 1 sec.
- Kinetic energy in pounds that pass in 1 sec.
- Transmitted energy per sec., equalling pressure times duct-section area times flow velocity.

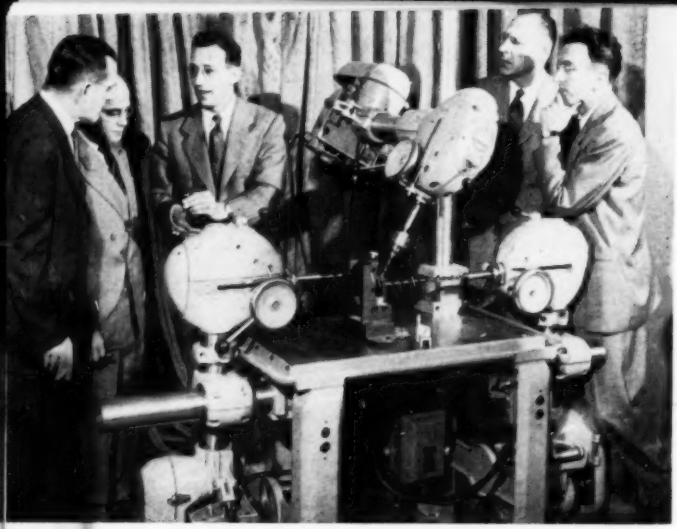
The first two points are easily understood and measurable. The concept of transmitted energy can be understood by thinking of water flowing downhill to a turbine through a constant-area pipe. Gravity works on it, but its kinetic energy cannot change and its internal energy is negligible. Gravity increases the transmitted energy by raising the pressure.

What Theory May Mean

What does Bailey's theory mean to the engineering world? If he is right, parts of all books on thermodynamics, aerodynamics, and hydraulics are wrong. Tables for gases and vapors must be revised. Computed turbine and boiler efficiencies will be different. Straightforward computation will replace a lot of costly "cut-and-try" work in developing turbines, pumps, jet engines, aircraft propellers, and air foils.

The new concepts will have to overcome a lot of tradition before they will be accepted. Bailey's claims will certainly start a wave of experimental investigation. Engineers and designers will check them.

Bailey's concepts will be completely presented in his book, *Thermodynamic Processes*, currently in press by McGraw-Hill Book Co. Tables of gas properties, vapor properties, and useful functions also are in preparation and will be issued shortly after the book is published.—Power, Mar, p74



DRILL SETUP HITS ALL ANGLES

New drilling equipment has unusual versatility. Throat is adjustable from 6½ to 14 in. Drill head revolves 360° both horizontally or vertically, either on or under the work table. Holes can be drilled in a piece of metal from almost any angle. Multiple setups permit simultaneous drilling of several holes at different angles in the same piece. Maker is Magna Engrg. Co.—Business Wk, Feb 23, p60

Electrolytic Method Grinds Carbide Tools Rapidly

Substitutes for grinding hard metals have been getting attention. Two such methods have been announced by Elox Co. and Firth Sterling Steel & Carbide Corp. They use an electric spark smothered in a fluid.

Another promising method, under development at United Drill & Tool Co., is a sort of electrolytic type of grinding. Chemical decomposition removes the stock.

A metal-bonded diamond wheel is insulated from the grinding machine by a fiber disk between wheel and adapter. Brushes are mounted behind the wheel and connected to the negative pole of a rectifier. The positive pole connects to the grounded table on which the work (carbide tool) rests.

As the wheel rotates, an electrolytic fluid floods the tool, forming a film between tool and wheel. Current is conducted from table to tool to metal bond of the wheel and back to the rectifier. The diamonds space the tool from the wheel and so prevent sparking and let the fluid flow between tool and wheel matrix.

A tungsten oxide film forms on the tool. The diamonds sweep the film away and thus allow constant chemical action. In this way, metal from the tool face rapidly dissolves and is carried away. Metal-removal speed is about four times as fast as diamond grinding. —Iron Age, Mar 6, p203

Measures Missile Forces

Forces from spinning of a missile are now being measured on a rotating model in the U. S. Naval Ordnance Laboratory's supersonic tunnel. The spinning model is powered by a tiny, frequency-controlled electric motor, designed and built by General Electric Co.

In the past, data for rotating projectiles have been determined from tests of fixed models, corrected for rotation by certain assumptions. Currently NOL is using the spin models to check the effects of centrifugal force on the boundary layer that influences both skin friction and base pressure drag. Studies have been made for Mach numbers between 2.5 and 4.5.—Aviation Wk, Mar 17, p23

Fresh Milk Is Now Canned without Special Handling

Asepetic canning of fresh whole milk is again in the news. Golden State Co., Ltd., of San Francisco has announced refinements in handling and processing methods.

Golden State's method is to use cool milk delivered to the plant in conventional tank trucks or cans. In contrast, Med-O-Milk, Inc. (McG-H Digest, Aug '51, p30) transports uncooled milk under vacuum in stainless-steel tanks.

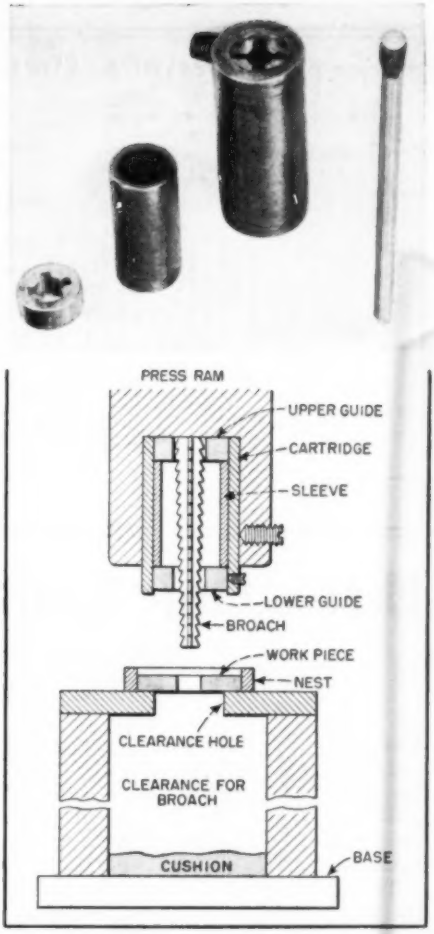
Transporting milk in the usual way eliminates need for the special handling equipment and allows the company to receive and process unlimited quantities of milk. Both equipment and processing should cost less.

Full details of the process have not been released because final patent rights have not yet been granted. But general information disclosed reveals that no special milking parlors are needed on the farms. Processing includes cooling at the farm. Then at the plant, the milk is processed through preheater, homogenizer, sterilizer, and holding and cooling units; all equipment is either of new types or modified. —Food Eng, Mar, p39

Builds "People's Houses"

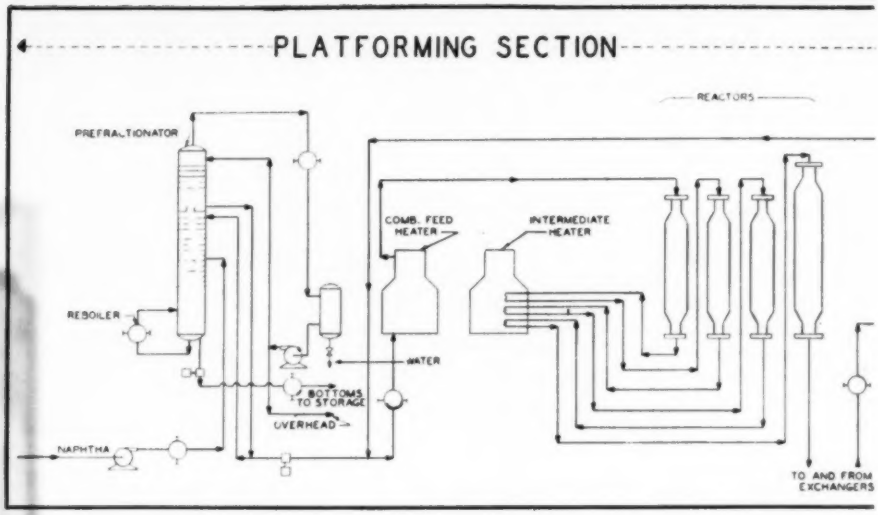
Recently two "people's houses" were opened in Leicestershire, England. These houses save vital materials and cost less while preserving room sizes at minimum standards established. They cost $2,716 each and will be rented at $1.75 a week less utilities.

Houses have two floors. The ground floor includes living room, dining annex, and a small kitchen. The top floor contains three bedrooms, bathroom, and a separate lavatory. Government target is 300,000 new houses a year.—Eng News-Rec, Mar 6, p64



MICROBROACHING TINY HOLES

No longer do you have to shy away from small irregular openings—you can push-broach them. Method of doing it was developed at Denison Industrial Corp. Broach, about 1½ in. long, is made from drill rod. It is supported rigidly by boring arbor-press ram to receive cartridge into which two brass slugs, previously broached by same broach, are fitted. Slugs guide broach and prevent it from buckling. —Am Mach, Mar 3, p134



Udex Unit Extracts Aromatics

New unit, first of its kind to go on stream, will produce aromatics from platformate at a rate of 500 bbl. per day

UDEX SOLVENT PROCESS, announced late last year (McG-H Digest, Jan, p32), has already been applied in a commercial operation. The Udex unit went on stream in March at Eastern States Petroleum Co.'s refinery in Texas.

The process was developed jointly by Dow Chemical Co. and Universal Oil Products Co. Its purpose is to separate aromatic concentrates from reformed petroleum naphthas.

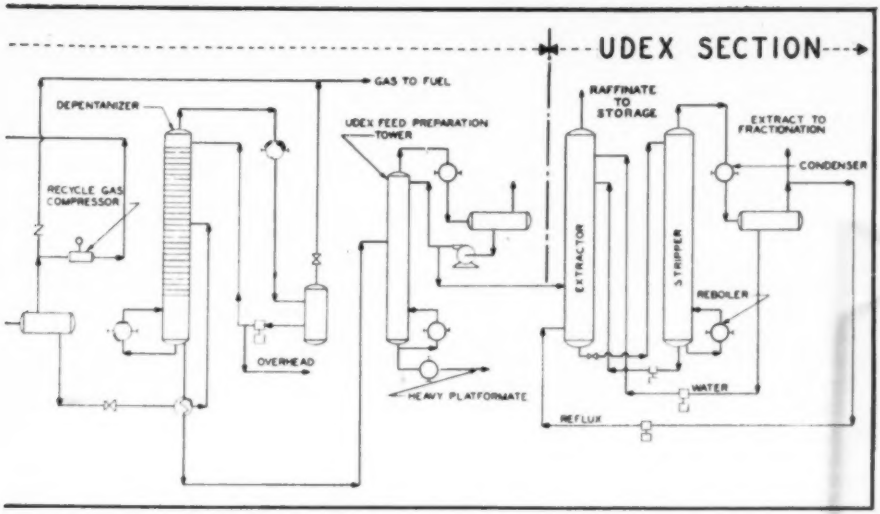
The new unit is designed to extract 500 bbl. of various aromatic hydrocarbons from a daily charge of 1,000 bbl. of platformate. Remainder of the output from the 7,000-bbl. platforming unit will produce aviation-gasoline base stock and motor fuel.

Benzene recovery is estimated at 99%. Potential products, besides benzene, include toluene, ortho-xylene, meta-xylene, para-xylene, ethyl benzene, and edible oil solvents.

For the platforming operation, full boiling-range straight-run gasoline is charged to a prefractionation tower. This column takes overhead the light fraction of pentanes and lighter. A naphtha fraction is taken as a side cut, mixed with recycle hydrogen gas, and fed to a heat exchanger and on to a battery of four reactors.

Platforming reactions, such as dehydrogenation and aromatization, occur there. Reactor effluent enters a product separator, which separates the gas and liquid.

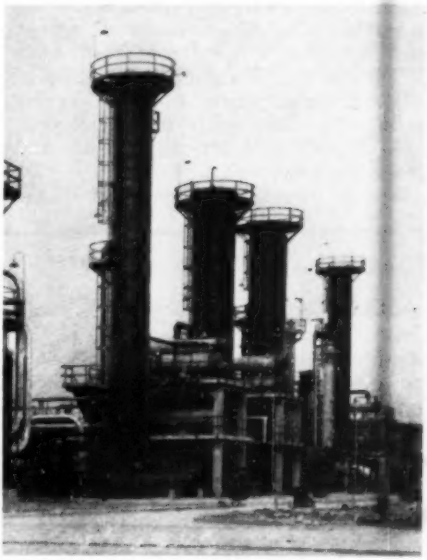
The liquid is fed to a stabilizer, which



acts primarily as a depentanizer with full benzene retention in the bottoms. The bottoms are fed to a feed preparation column, in which feed for the Udex unit is separated as an overhead fraction. This cut has 25% benzene.

The overhead fraction enters an extractor, in which glycol solvent flows countercurrently to the feed. Solubility and selectivity of the glycol are controlled by the ratio of water in the mixture. As these characteristics change slowly, substantially isothermal operation results. Use of a solvent with a higher boiling point than the aromatics results in a lower heat load.

The extract is fed to a solvent-recovery column, in which the benzene is stripped. The lean solvent returns to the extractor. Some of the benzene concentrate recovered from the stripper is returned to the extractor as reflux. The aromatics provide feed to a fractionating tower where the benzene is taken off.—Oil & Gas J, Mar 3, p55



***UDEX UNIT** as Eastern States' refinery is tied in at the left with the platforming unit, as shown in the flow diagram*

Power Survey Now Reveals Trends in Modern Plants

Annual survey by *Power* magazine indicates that 22,200,000 kw. of new steam capacity will start operating in the U. S. in 1951, 1952, and 1953. Over 4,200,000 kw. are scheduled for 1954.

The survey includes, for the first time, boilers of 1.4-million lb. per hr., turbines of 200,000 kw., temperatures of 1100° F., and heat releases less than 10,000 Btu. per cu. ft. per hr.

Rising costs push designers to higher pressures and temperatures, larger equipment, more regenerative feed heating, multiple-fuel firing, use of poorer fuels, centralization of controls.

Remarkable acceptance of reheat units should boost station efficiency. In the period surveyed, 144 reheat units will be started for 15-million kw. against 306 straight regenerative for 13-million kw. Average size of reheat unit is 106,000 kw., compared with 45,000 kw. for straight regeneration.

In industrial plants, the trend seems to be: (1) some shifts in fuel choices and (2) increased attention to air and steam pollution.

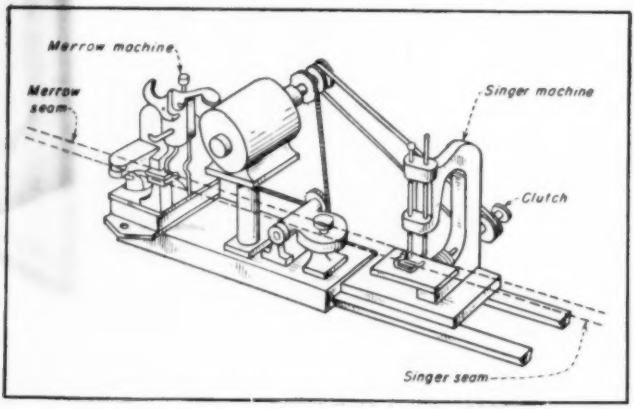
Hydro power continued its rapid growth during 1951 and should go on doing so for some time to come. Over 1.6-million hp. went into service last year; 2.5-million are planned for this year. Next year should add 1.5-million more.—Power, Mar, p79

Show Draws Suppliers

Over 1,500 German manufacturers and their agents flocked into the former I. G. Farben building in Frankfurt on the first day of a week-long "Materiel Exhibit" put on by the U. S. Air Force in Europe.

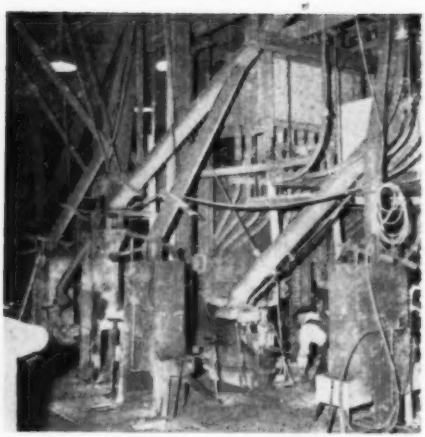
There are more than 100,000 items which the U. S. Air Force would like to buy in Europe. Comprehensive lists of all categories of items were handed each businessman visiting the exhibit, together with detailed questionnaires that, when evaluated, will give USAFE a pretty complete picture of "who is able to manufacture what for us."

Besides German manufacturers, representatives from France, England, Norway, Belgium, and Denmark also attended. Air Force officials expect, on the basis of the good German showing, that similar exhibits will be held in Paris and Rome.—Aviation Wk, Feb 18, p32



SEWS TWO SEAMS

Sewing machines rigged up as shown sew two seams at once. In operation, cloth is placed in the Singer head. Then machines move down track until Merrow machine reaches cloth. Seamer hits Singer machine clutch, taking it out of action. Now Merrow machine is fed. With both machines fed, both clutches are operated and two seams sewn.—Textile World, Feb, p194



FEED BOXES on smelting furnace show how carefully smelting is controlled

BUCKETS standing before smelting furnace receive titanium slag and iron

Titanium Smelter in Action

Importance of titanium metal and its oxides is growing as world's major titanium mine and smelter swing into full-scale production

IN QUEBEC, with ore from the world's largest ilmenite deposit at Allard Lake, the first large-scale titanium smelter, at Sorel, is ready to produce a rich titanium slag and refined iron. Both operations are conducted by Quebec Iron & Titanium Corp. QIT's initial production cycle from mine to market has been set in motion. Principal future expansion will be in the smelter where additional furnaces are being installed and techniques constantly improved.

Titanium smelting consumes much electricity and so Sorel is located close to an ample power source. Also, ore is shipped about 550 miles along the St. Lawrence River from mine to smelter.

A traveling unloader at dockside removes ore from the ship and discharges it into a conveyor system that stockpiles it near the smelter. Coal is unloaded from railroad cars and also stockpiled by the conveyor system.

Ore and coal go from the stockpiles through dryers and crushers to hoppers that feed the smelting furnace. Capacity of each furnace is 300 tons of ore per day. Ore is blended with 43 tons of coal and fed on a continuous basis. This process makes it possible to produce a high-grade slag. Even the ash content of the coal (anthracite) must be low to keep impurities out.

Furnaces are box-shaped, steel-framed, refractory-lined units containing six graphite electrodes in line—two for each phase of the three-phase power. Amplidyne controls constantly adjust the elevation of the graphite electrodes to maintain proper temperatures and arc voltage. Smelting is done at about 3000° F.

Feed must be introduced into the

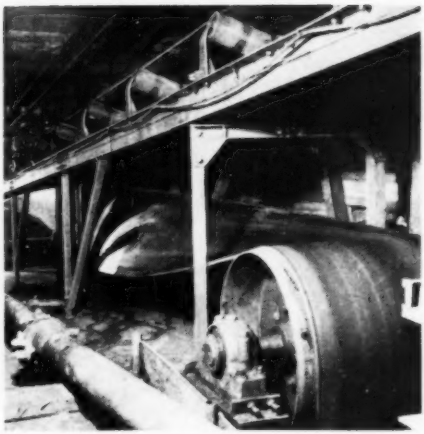
furnace in such a way that it will keep the hot slag away from the furnace lining. Hoppers and downspouts on top of the furnace feed just the right amount of material to just the right part of the furnace and at just the right rate.

The smelting operation is a reducing one in which most of the iron in the ilmenite and associated hematite is extracted as molten metal, and remaining ingredients go into the slag. The furnace atmosphere is maintained at a slight positive pressure and contains about 80% CO. The pressure prevents contamination by air, but also means that the furnace must be adequately sealed.

Titanium slag is tapped off periodically into a cast-steel slag pot and transferred by crane to a tilting mechanism. The tilting mechanism slowly dumps the pot with a controlled flow to a modified pig-casting machine. The slag is water quenched on the casting machine and drops to a surge pile. It is then crushed and stored for shipment.

Molten iron is also tapped periodically and transferred from the smelter to the 60-ton electric arc-type refining furnaces. The refining process is principally a sulphur removing problem. Desulphurization is accomplished by introducing lime and other fluxes into the molten bath under nitrogen gas pressure; gas flows through an expendable steel lance. The nitrogen acts as a flux carrier and produces sufficient agitation to give intimate mix between metal and slag.

The two refining furnaces now installed will be sufficient to handle the iron product coming from the five smelting furnaces scheduled for operation by late 1952. Refined iron is cast into ingots weighing about 10,000 lb. By the end of 1952, the iron will be cast by a pig-casting machine capable of producing 80- to 100-lb. pigs.—Eng & Min J, Mar, p72



"TURNOVER" BELT CARRIES MORE

New belt-conveyor system has belt turn itself over after delivering its load and then turn back 180° before taking on a new load. Belt's clean side is always on the idlers. System increases carrying capacity of conveyors as much as 20%. Developed jointly by B. F. Goodrich Co. and Chain Belt Co., the system is particularly applicable where loads have been restricted below actual capacity because of danger of spillage onto the lower return run.—Coal Age, Mar, p85

"Electronic Office" Nearer

Recently Potter Instrument Co. demonstrated part of a system—an electronic printer, called the "flying typewriter"—that it believes will form an electronic clerical system. The new unit will print 24,000 characters a minute. The rest of the system has not been revealed yet.

The "flying typewriter" can find a place right now with punch-card systems for jobs where high-speed printing is needed. Another application will be with electronic computers. Printing of the computer output has lagged behind the computer's figuring. Potter says that one of its printers will do the work of 50 regular typewriters.—Business Wk, Mar 15, p117

NORWAY TO OPEN UP ITS FAR NORTH

The Norwegian Parliament has approved an 8- to 10-yr. plan to build up northern Norway. The program provides for development of industry, agriculture, and communications. It also aims to cut down unemployment, raise standards of living. The land is rich in mineral resources. South Varanger, with an ice-free harbor, is Norway's greatest iron-producing center. Other undeveloped resources include pyrite deposits, zinc, copper, graphite, and molybdenum. The plan is an example of Scandinavia's system of "mixed economy." The government lays the groundwork and offers support with loans and reduced taxes, but private industry is encouraged to shoulder the burden of developing its own projects. —Business Wk, Mar 22, p184

Chemical Technology Gains by Advanced Processing

The chemical industry has made vast progress in the last few years. Here is a roundup of some developments.

• U. S. Atomic Energy Commission has developed a highly secret process to take uranium from the wet-process phosphoric acid used in making concentrated superphosphates. Work also is underway on recovering fissionable metal from single-strength and nitric acid supers.

• Latest news on titanium comes from Columbia University. A graduate student, Arthur Kerbecek, has succeeded in electrolyzing titanium tetrachloride.

• Sulfur will be obtained from low-grade ores by Chemical Construction Co.'s new process. One unit is now being installed in Columbia. Ore is ground, screened, heated in water slurry, quenched, and subjected to froth flotation (McG-H Digest, June '51, p44).

• Lignite will be used commercially this year. Boilers at a new Aluminum Co. of America plant in Texas will be fired with lignite char from a low-temperature carbonization plant.

• Producing aromatics from petroleum fractions by catalytic reforming requires that aromatics be separated from other hydrocarbons in the reformer product. Sun Oil Co. is building a plant to do this by selective absorption. Process is called Arosorb (McG-H Digest, Nov '51, p28).

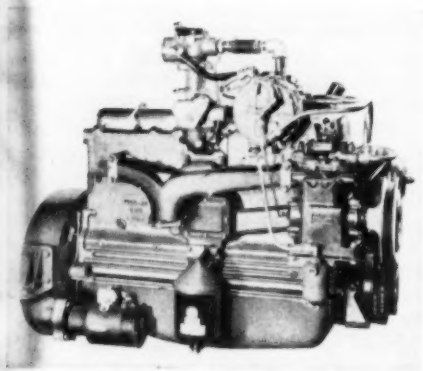
• Plastic pipe is gaining. Three polymers contend for honors—polyvinyl chloride, polyethylene, and reinforced polyesters. Another introduced last year is Tennessee Eastman's Tenite II, a cellulose acetate-butyrate.—Chem Eng, Feb, p150

NEW EQUIPMENT...

Process Pump—Type PR pump can handle petroleum hydrocarbons, water, or chemical solutions, depending on choice of construction materials. Capacity is 1,000 gal. per min. at heads to 625 ft. and temperatures to 850° F.—**Food Machinery & Chemical Corp.**—Power, Mar, p172

Spot-welds Plywood—Portable high-frequency electric gluing unit sets glue instantaneously when placing plywood panels. "Spot-welding" technique eliminates tack nails and brads.—**U. S. Plywood Corp.**—Marine Eng, Mar, p122

Protects Aluminum—Specially treated tissue paper prevents water staining of stacked aluminum sheets. A chemical inhibitor also prevents abrasion.—**Kaiser Aluminum & Chemical Corp.**—Aviation Wk, Mar 3, p51



FACTORY-BUILT LPG ENGINE

The new Reo Motors, Inc., 331-cu. in., 142-hp. Gold Comet engine for liquefied petroleum gas has been designed and developed specifically for LPG truck applications. It is not a conversion unit. The engine has been installed in a new truck series and is offered as a replacement power plant for trucks of any make.—Auto Ind, Mar 1, p14

Defrosts Three Ways—Refrigerators models G-93-D and G-85-D feature Tri-Matic defrosting: (1) automatic defrosting for every morning at 3 A.M., (2) electric defrosting by changing control setting at any time—takes 15 min., and (3) conventional defrosting when interior needs cleaning.—**International Harvester Co.**—Elec Merch, Mar, p156

Fiber-glass Fabric—Silicone-rubber sheets reinforced with woven fiber glass have good resistance to tearing, stretching, rupturing. It is flexible at temperatures from −100° to 500° F. and highly resistant to chemical attack.—**Connecticut Hard Rubber Co.**—Chem Eng, p232

Gear Grinder—Model SGP Red Ring grinder form-grinds helical gears, spur gears, splines. Lead bar maintains true helix lead. Live-center headstock has automatic index mechanism. Lead bar is disconnected for grinding spur gears; indexing is manual.—**National Broach & Machine Co.**—Am Mach, Mar 3, p183

Two-speed Counter—It is hard to make cutoff at the right place when batch-counting conveyorized parts that move fast. Electronic counter slows down belt near end of run, actuates cutoff, then returns belt to normal speed.—**Potter Instrument Co., Inc.**—Factory, Feb, p188

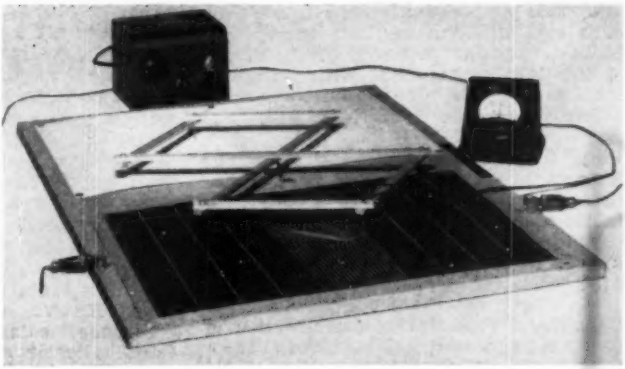
System Controls Lighting—Luxtrol system consists of one or more miniature positioner stations controlling one or more motor-driven dimmers. Dimmer operation can be preset, and dimming apparatus can be located away from control stations.—**Superior Electric Co.**—Elec West, Feb, p46

Tells pH—Battery-operated model N pH meter is lightweight, compact, rugged enough for use in shop or field. It measures 4x6x9½ in., weighs less than 8 lb. Meter can be used horizontal or vertical. —**Bechman Instruments, Inc.**—Paper Ind, Feb, p1354

. . . AND MATERIALS

FIELD PLOTTER

Portable analog field plotter solves complex two-dimensional field problems. It sets up electrical field patterns on conducting-paper surface on plotting board. Analog between field and related field problems allows solution. Other uses are to study air flow patterns, fluid flow, temperature distribution, velocity gradients (as in turbines). Maker is General Electric Co.—Power, Mar, p157



Combination Heat Unit—Weathermaker is a packaged home heat and air-conditioning assembly made up of gas furnace for heating and heat pump for cooling. Damper lever changes from one unit to another.—**Carrier Corp.**—Elec World, Feb 25, p119

Antimalarial Drug—Modification of hydrangea alkaloid is being tested in clinical studies. Results so far indicate that the drug is many times more active than quinine.—**Lederle Lab. Div., American Cyanamid Co.**—Chem Wk, Jan 26, p34

Torque Converter—Single-stage unit combines hydraulic torque converter and hydraulic coupling. It provides automatic transmission for shovels, cranes, oilwell rigs, service equipment. It can be used with engines up to 300 hp. Torque ratio varies up to 3:1.—**Torcon Corp.**—Oil & Gas J, Feb 18, p163

Pocket-size Calculator—Intricate mechanical calculator adds, subtracts, multiplies, divides, and figures square roots, factors, cubes, and percentages. The machine carries out to five decimal places and totals figures up to 99-billion. It fits in the palm of your hand.—**Curta Calculator Co.**—Business Wk, Mar 8, p130

Self-priming Pumps—New motor pump line is designed for use under suction lift where air or vapor prohibits conventional centrifugal pumps—as in process and bulk-station applications, mine drainage, bilge and sump pumping. Pumps prime themselves. Sizes are ¼ to 25 hp. with capacities to 800 gal. per min.—**Ingersoll-Rand Co.**—Prod Eng, Mar, p205

One Man Loads, Unloads—Entire 96-in. wide platform of GTTA tilt trailer tips back at the release of a simple lock. Machine climbs aboard trailer without need of skids, timbers, or cribbing. Unloading is just as simple.—**La Crosse Trailer Corp.**—Const Meth & Equip, Mar, p124

Exhausts Hot Air—Intermittent or emergency removal of large volumes of air is done quickly with an "Air-Mover." It converts air or steam supply into large induced volume of moving air by expansion.—**Mine Safety Appliances Co.**—Weld Eng, Mar, p78

Sealed Rectifier—Hermetically sealed selenium rectifier has standard tube-base terminals. Unit is rated at 390 v. rms.; 550 v. peak inverse; 129 ma., 160 v. d.c. output at 35° C.—**International Rectifier Corp.**—Aviation Wk, Mar 10, p57

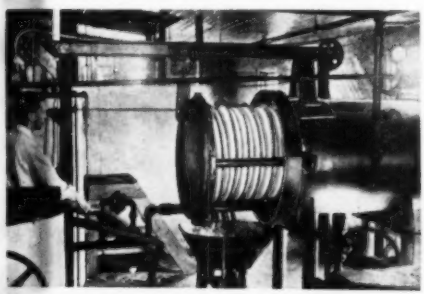
NEW EQUIPMENT (Cont.)

Mercury Lamps—Two new mercury lamps with built-in reflectors are offered for industrial use. Model H 400-RL is 400-w. bulb 11¾ in. long and 6½ in. in dia. Light is regular mercury color. Model H 400-RC1 is same but with phosphor coating on inside of outer bulb.—**General Electric Co.**—Elec C&M, Mar, p133

Vinyl Resin Latexes—Pliovac Latex 300 imparts grease-proofness, chemical resistance, and resistance to moisture to fabric coated with the material. Physical properties are also improved.—**Goodyear Tire & Rubber Co.**—Textile World, Mar, p184

Centrifugal Fan—Motor drive section of new fan has waterproof hood for outdoor installation. High efficiency, low noise, and low horsepower are claimed.—**Trane Co.**—Am Builder, Mar, p154

Grinding Wheel—Same wheel can rough-grind, finish-grind, and notch. Designed for right-angle portable grinders, wheel is made of carded web material impregnated with abrasive grain.—**Norton Co.**—Ind Dist, Mar, p132



FILTER CUTS CLEANING TIME

Horizontal pressure-leaf filter, made by Niagara Filter Corp., does not use cloth. It consists of horizontal tank with retractable carriage on which stainless-steel leaves are vertically mounted. Leaves are quickly accessible for cleaning by actuating windlass and monorail. Filter is intended for filtering large volumes of solids, as with vegetable oils.—Food Eng, Mar, p116

Wire Take-up—Davis-Standard unit for electrical wire and cable manufacture operates smoothly at high production speeds. Reel drive is by double V-belts. Traverse mechanism is actuated by air. Reel sizes are 6 to 36 in.—**Standard Machinery Co.**—Iron Age, Feb 28, p130

Ac. to Dc.—Selenium rectifier conversion unit of high current and voltage capacities is designed for use with vibratory feeders, grizzlies, bin vibrators, and electromagnetic hammers. Large cell size keeps unit weight low.—**Syntron Co.**—Ceramic Ind, Feb, p114

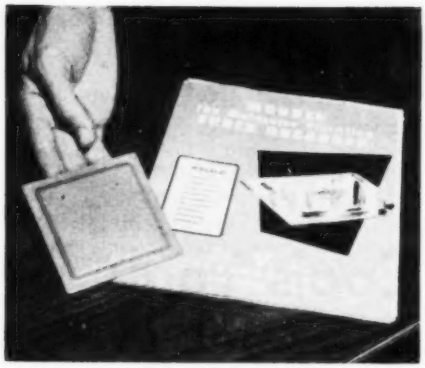
Ball-bearing Play — New comparator measures radial play of small ball bearings. Known as Electrolimit internal clearance comparator-lever type, it handles bearings from 3/32 to ½-in. bore. —**Pratt & Whitney Div., Niles-Bement-Pond Co.**—Prod Eng, Feb, p216

Packaged Rolling Mills—Packaged mill is small, single-stand unit for rolling metal. Power supply also is packaged unit—a 75-hp. motor-generator set, small booster m-g. set, and control apparatus. —**Westinghouse Electric Corp.**—Iron Age, Jan 24, p96

Compact Liquid Filler—Unit is designed for use where high-production models are impractical. Two types are available: one fills by gravity; other is pump operated. Capacity is 25 containers a minute. —**Packer Machy. Corp.**—Mod Packaging, Feb, p134

Pulls and Inserts Ties—Self-propelled machine is designed for out-of-face tie-renewal and track-raising operations. Machine can also operate as a light-duty crane.—**Nordberg Mfg. Co.**—Rail Eng & Main, Mar, p288

Flexible Hose—New Flexaust hose is made of Neoprene compounds impregnated with nylon chafer duck and reinforced with wire. Lightweight and strong, it is suitable for vacuum or pressure operations or gravity feeds.—**American Ventilating Hose Co.**—Chem Wk, Mar 8, p38



ABSORBS VIBRATION

Device employs new principle of converting mechanical energy of vibration into radiant heat. Absorber made by MVA Corp. consists of a large number of thin copper plates or disks placed on top of each other but separated by a thin layer of air and oil, all hermetically sealed into a steel jacket.—Textile World, Mar, p137

Increases Tool Life—Metalloid X-20 increases cutting-tool life, speeds, and feeds in any metal-removal process. It is a chemical compound that limits movement of atoms in crystal lattice of metal being cut. It reduces heat generated by plastic flow of metal.—**Metalloid Corp.**—Am Mach, Feb 18, p196

Fanfold Biller—Electric fanfold writing machine produces good copies fast. A 10-key tabulator positions carriage to predetermined decimal locations.—**Underwood Corp.**—Am Business, Feb, p59

New Heat Machine—Heater blows warm air along the floor out of its base, creating a 6-ft. high heat blanket. Heat output is 140,000 Btu.—**Fageol Heat Machine Co.**—Eng News-Rec, Mar 13, p148

Electronic Timer—Model 701 timer is accurate to within 0.5% of time cycle. Time interval is continuously adjustable—from 0.05 to 20 sec. Instrument operates on 105 or 130 v., 50 or 60 c. Size is 6x3x6 in. —**Timetrol Co.**—Electronics, Mar, p322

Limit Switch—Hermetically sealed limit switch is for use where ordinary splashproof or enclosed switches are not suitable because of humid or corrosive atmosphere. Switch has tipping diaphragm action. Weight is 0.38 lb.—**Exhibit Supply Co.**—Elec World, Mar 10, p147

Portable Ion Exchanger—Unit permits recovery of contaminated chromium plating baths. It is made in four sizes, in stationary as well as portable models. —**Illinois Water Treatment Co.**—Chem Eng, Feb, p210

Dual-purpose Hand Truck—Dual-purpose superstructure on hand truck will handle 7- and 12-in. skids as well as single- or double-faced pallets. Truck is available with either mechanical or hydraulic lift. —**Yale & Towne Mfg. Co.**—Factory, Mar, p180

Makes Packages Fast—Packaging machine, known as Oto-Pak, produces flat bags from packaging films, such as polyethylene, Pliofilm, saran, and holds them open for filling. Speed is 35 to 40 bags per min.—**P-N-R Corp.**—Food Eng, Mar, p127

Industrial Receptacle—Heavy-duty, 20-amp., two-wire, flush receptacle is molded of Bakelite. It accommodates all standard single-outlet plugs.—**Rodale Mfg. Co., Inc.**—Elec Whols, Feb, p94

High-head Pump—BJ Subette pump is a small submersible type designed for small capacities at high heads from wells 6 in. in dia. or larger. Pump capacity range from 30 to 130 gpm. at heads of 30 to 770 ft.—**Byron Jackson Co.**—Eng News-Rec, Jan 24, p106

READER SERVICE

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- **To machine the unmachinable, carbon dioxide is now being applied as a cutting fluid with outstanding success.**
- **Carbon dioxide is finding use on hardened tool steel, titanium alloys, Hastelloy, Inconel, high-nickel alloys.**
- **This cooling method may be just the medicine your machining headaches need. Here's how . . .**

Carbon Dioxide Cools Tools

RECENT DEVELOPMENTS of "hard-to-machine" alloys have focused attention on machining and cooling problems. One way to increase cutting speed is to use tools with greater red hardness.

A second way is to provide better cooling, either by new cutting fluids or new ways of delivering them (as in jet cooling—McG-H Digest, Apr p 50). One of the strangest of new cutting fluids is a gas rather than a liquid—carbon dioxide. Advantages include:

1. There is no spatter or oil smoke.
2. Controlled temperature insures dimensional and metallurgical stability.
3. Carbon dioxide will not combine with work materials.
4. It permits machining of alloys on which other coolants have failed. Speeds can be increased, and high-speed-steel tools substituted for carbide tools.
5. Tools can be reground at high speed. Carbide tools can be finished with "green" silicon-carbide wheels instead of diamond wheels.

Disadvantages of carbon dioxide as a coolant include its high cost (as it is expendable), ventilation needs, possible but unlikely burning of skin, and high capital investment (about $2,500 for generating equipment for small shops).

Liquid carbon dioxide is fed to the cutting zone at a rate that maintains

***CHIP** at top is from machining dry a 15% Cr, 15% Ni, 2.5% W alloy. It is straw colored while heavier chip (below), cut with CO_2, is bright. Speeds and feeds were more than doubled. Tool life was longer.*

room temperature there. It is transported at 850 psi. to a jet or series of jets accurately built to measure output.

The jets are placed to meet the heat radiations of the cutting operation. As the liquid carbon dioxide is emitted from the jet, it changes to a finely divided solid. The solid carbon dioxide, at a temperature of −78.5° C., absorbs radiant heat rapidly and makes an almost constant working temperature possible.

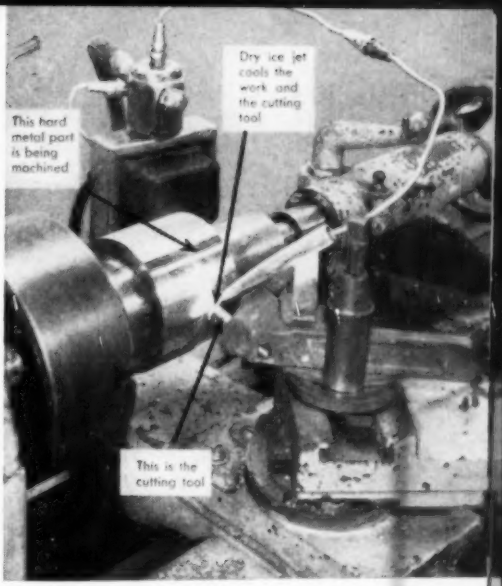
Carbon dioxide is being widely applied to machining of difficult alloys in U. S. defense plants. Operations include turning, milling, planing, drilling, tapping, broaching, trepanning, grinding. Work is dry and no other agents are tolerated as contaminants of the carbon dioxide. When the work is finished, it is clean, dry, and ready for following processes.

Heat-treated steel can be machined readily with carbon dioxide. Gear blanks hardened to 50 Rockwell C are cut with high-speed-steel tools. A chromium-molybdenum blank at 43 R_c is machined in 1 hr., compared with previous machining time of 4 hr.

Hadfield's steel (13% Mn) is being machined with 3/16-in. cuts at 0.035-in. feed and 150-ft.-per-min. speed. On alloys containing 20 to 25% chromium, 10 to 14% nickel, and 2.5 to 3.5% tungsten, speeds have been increased from 80 ft. per min. at a feed of 0.010 in. per revolution to 300 ft. per min, at 0.020 in. Cutting is done without work-hardening and to close tolerances.

Stainless steels 18-8 and straight chromium alloys are free machining with carbon dioxide at high speeds. Stainless 18-8 is being rough-cut at more than 300 ft. per min. and finished at 900 ft. per min. at room temperature.

Other alloys successfully machined are Hastelloy A, B, C and D; Multimet; Haynes 25; and precision castings of



***CARBON DIOXIDE** is directed at the cutting point by jet supplied at 850-psi. pressure. Liquid changes to solid CO_2.*

other high-nickel and chromium-cobalt compositions. Inconel and Inconel X are rough-machined at over 175 ft. per min.; finished at 250 ft. per min.

Titanium alloys, cooled with carbon dioxide, are not oxidized and therefore render a valuable chip. Alloy 150A is roughed, through the scale, at 300 ft. per min. at a 5/16-in. depth and 0.010-in. feed.

Machining is done at room temperature. So expansion characteristics of metal or alloy do not apply. Burnishing is avoided and burring is reduced. Many types of gears are being hobbed without burrs.

Carbon dioxide cooling to date has been successful. As the development expands, materials and tools may be used that have been avoided in the past because of machining difficulties. Process patents have been applied for by CO_2 Development Co. in most free countries.—Am Mach, Mar 3, p129

This Safety Program Cuts Lost-Time Accidents

Stove Container Corp. started its safety program in 1950 because of dissatisfaction with its 1949 safety record. The 1949 lost-time accident frequency rate (number of lost-time accidents per 1-million man-hours worked) was 11.60. After the program was installed, lost-time accidents dropped to 1.88. Some of the things that made the program pay off are:

1. Safety devices are constantly being put on machines and equipment.
2. Safety shoes are worn by more than 75% of employees.
3. Safety glasses are worn by all employees working on lathes and shapers.
4. Wearing safe and suitable clothing is constantly encouraged.
5. Plant lighting has been specially studied, and improved where necessary.
6. Color has been used as a direct aid to safe operations.
7. Good housekeeping is a must.
8. Top management's attitude is sound and realistic.
9. An active safety committee runs the whole program.
10. Fast action is the rule in correcting hazards.
11. Publicity and safety "sales promotion" are simple and effective.—Factory, Feb, p124

Ceramic Permanent Magnet

Phillips Research Laboratory in Eindhoven, Holland, has developed permanent magnets from a ceramic material rather than from conventional magnet steels. They already are in use in Phillips radio-receiver loudspeakers.

The new material, an oxide, is produced by sintering. Called Ferroxdure, it contains iron oxide and barium. It is hard and has a 4.8 specific gravity.

Magnetic saturation is low, but this disadvantage has been overcome by increasing the magnet's dimensions perpendicular to the direction of magnetization to increase the number of lines of magnetic force. As a result, magnets resemble flat disks or plates.

Electrical conductivity also is low. This is a big advantage when the magnet is exposed to alternating-current fields. Because of its high magnetic hardness, Ferroxdure is suitable too for use when exposed to strong demagnetizing fields.—Prod Eng, Mar, p197

Ultrasonics Salvage Metal

High-frequency vibration literally shakes glass beads of tungsten rods salvaged from vacuum tubes that have proved faulty during manufacture. Raytheon Mfg. Co. developed the device which permits removal of glass sealed to the tungsten rods ten times faster than possible with previous methods.—Marine Eng, Mar, p120

Cold Extracts Hydrocarbons

Interesting development in natural-gas pipe-lining practice is dehydration and hydrocarbon extraction by refrigeration at Tennessee Gas Transmission Co.'s new gas-processing plant.

Ethane and heavier hydrocarbons are separated from the gas stream by cooling the gas until the hydrocarbons condense. The refrigerating unit, with a capacity equivalent to a 12,000-ton-per-day ice-making plant, chills the gas to —96° F.

Liquid hydrocarbons are flashed twice at successively lower pressures and then fractionated to remove methane and to control the amount of ethane present. They are then sent to a chemical plant for conversion to liquefied petroleum gas, natural gasoline, and ethane.—Oil & Gas J, Mar 10, p95

SUCCESS IN 1831 of McCormick's reaper led to International Harvester's mechanizing and . . .

Powering the World's Farms

Any nation, before it can industrialize its economy, must have a firm agricultural foundation to build on. Here we tell how International Harvester has helped the world's nations to lay that foundation

BEGINNING A SECOND CENTURY of world trade, International Harvester Co. looks back with pride on a past century of achievement and forward with hope and enthusiasm to the challenge of the next.

It all started in 1831 when Cyrus Hall McCormick, near Steele's Tavern in Virginia, proved to himself and his dubious neighbors that his peculiar-looking reaping machine would really work. As the young inventor walked behind his machine, Jo Anderson, his helper, raked the platform clear of cut wheat.

And so the first step in mechanizing the harvest was taken. Up to that time, the sickle and scythe and cradle were the tools of reaping; man was still chained to the land to grow his living. But development of the reaper was followed by the invention of the steel plow to replace the ancient inefficient wooden plow and of the thresher to replace the flail.

These three modern farming tools released manpower to the factory and city, made possible the opening of wide expanses of wheat-growing land, particularly in the Americas and Australia.

In 1831, 80% of the American

people with sickle and scythe were needed to feed a population of only 13-million. But now, a million and a quarter fewer farm hands working with modern power tools are needed to feed 155-million people and yet raise enough grain so nearly half of it can be sent abroad. Mechanization, of course, is not soley responsible for this vast progress. Improvements in agronomy, pest control, seeds, fertilizers have done their share.

Twenty years after the successful trial run in Virginia, McCormick took his reaper abroad to the great Crystal Palace Exhibition in London. There it was met by the scorn of the press.

The *London Times* called it "a cross between a flying machine, a wheelbarrow, and an Astley chariot" and went on to say, "Other nations rely upon their proficiency in the arts, or in manufacture, or in machinery, for production effects. Not so with America; she is proud of her agricultural implements which will be rejected as worthless." Other papers commented, "An extravagant Yankee contrivance," . . . "huge, unwieldy, unsightly, and incomprehensible."

But the McCormick reaper, after winning a practical test by harvesting 20 acres of wheat in 1 day at Tiptree Heath, was voted the highest award of the Exposition, the Council Medal.

Then from the *London Times*, "The American exhibit has justly assumed a position of first importance as having brought to the aid of our distressed agriculturists, a machine, wh ich .. . will amply remunerate England for all her outlay connected with the Great Exhibition."

McCormick reapers began to appear in the fields of England the following year. In 1855, the McCormick machine won the Grand Gold Medal of Honor, the highest award of the International Exposition of Paris. In the next few years, the reaper brought McCormick a harvest of prizes. And his machines appeared in Poland and Prussia in 1856 and in Russia in 1858.

***PHILIPPINE** upland rice-growing project tripled usual yield with IH technical assistance and machines, including 125 of these self-propelled harvester-threshers*

News of the successful reaper spread, and the next decade found it at work in all the grain countries of Europe and in Persia, India, Australia, South Africa, and South America. By 1880, the McCormick reaper was the leading machine wherever grass and grain were grown. To McCormick, who during his lifetime sold 12,000 reapers outside the U. S.—and made little profit from them—it was enough that his name stood for progress in the markets and on the farms throughout the world.

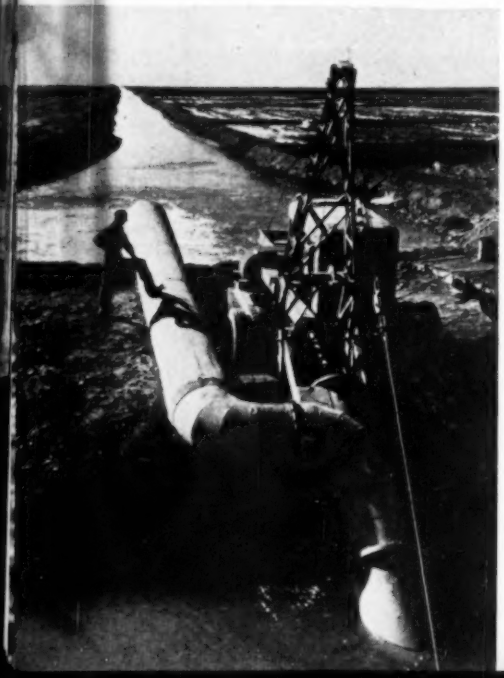
These machines, and the others that went with them to make up power farming, have posted this record in Europe: Germany has reduced the number of her farm workers from 75% of her total population in 1851 to 30% today; Sweden, from 80 to 27%; Switzerland, from 41 to 21%; and

*← **FURROWS** and plowed fields are symbols of IH's success in mechanizing the world's farms*

France, from 53 to 25%. In Great Britain, only 2% work in agriculture; 17% in Belgium; 30% in Denmark.

Of the other machines that helped mechanize farming, the tractor has shown remarkable growth in Europe —six-fold in the last 20 years. In England, the increase was a spectacular gain from 20,000 to 300,000. France and Germany each have 140,000 in use; Sweden, 65,000.

From Europe, the reaper and its mechanical cousins spread across the Mediterranean to Africa. British East Africa and South Africa have gone far toward mechanization of their agriculture. And in Australia and New Zealand, the record is even more impressive. Australia has progressed from a food-importing nation in 1851 to one of the four greatest grain exporters of the world. New Zealand, through power farming, has risen to be the top exporter of lamb and mutton and a big exporter of wool.



Without labor-saving machinery on the farm, 85% of all the world's people today would have to work in agriculture to feed themselves and the other 15%. Industrialization would be almost impossible. Realization of these facts years ago led McCormick, and his son after him, to advocate the expansion of foreign markets. That they were right is shown clearly and sadly by the many nations that have clung tightly to their traditional farming methods and have never risen to be first-class powers.

Builds for Foreign Business

This urge for foreign expansion, among other factors, finally led, in 1902, to the birth of International Harvester Co. by merger of the McCormick Harvesting Machine Co., Deering Harvesting Co., Plano Manufacturing Co., Warder, Bushnell and Glessner Co., and the Milwaukee Harvester Co.

The new organization moved forward rapidly, both at home and abroad. At home, multiple manufacturing operations were integrated and coodinated. Abroad, sales organizations were established all over the world. And soon the decision was made to manufacture overseas in order to avoid high import duties, supply machines at lower cost, and provide the special-type machines needed for certain markets.

The first plant outside the U. S. was built in Hamilton, Ontario, in 1903. It soon was turning out harvesting machinery, tillage implements, seeders. By 1911, another Canadian plant, at Chatham, was manufacturing motor trucks.

The first European plant was acquired at Norrkoping, Sweden, in 1905

IH POWER UNITS run the pumps that lift the water to irrigate countless acres of otherwise useless land

DANISH work horses look down their noses at one of their sucessors now mechanizing the fields of Denmark; since the war, the number of tractors jumped from 4,400 to about 20,000

to make rakes, mowers, and reaping-machine attachments. In 1909 and 1910, two more European plants were built at Croix, France, and Neuss, Germany, to manufacture farm implements. And twine mills were soon established in those countries. In the same year of 1910, International Harvester bought a factory near Moscow to manufacture a Russian-type reaper, mowers, and gas engines.

Development of world markets was set back by World War I with its plant damage and loss of the Russian factory. But between the wars, foreign business climbed steadily. Demand for binder twine, for example, mounted so high that a hemp plantation near Madaum, Philippines, was bought in 1928 to insure the supply. Then came World War II and the troublesome postwar problems.

Greater expansion was the answer. In 5 years (1946–1951), the company and its subsidiaries spent more than a quarter billion dollars at home and abroad on new and improved manufacturing, sales and service facilities. And at the same time, new products were developed. Just as the tractor and truck were developed in the 1920's (now they are the "giants" in the company's varied line of products), new products brought out in the late 1940's included a popular line of refrigerators and freezers and the long-awaited mechanical cotton picker.

New plants went into England, France, Australia, Mexico, and Brazil. A factory at Doncaster, England, began rolling out Farmall M tractors in 1949 and soon added other products.

In France, International Harvester's affiliate, Compagnie Internationale des Machines Agricoles (CIMA), operated the two plants at Croix and one at Montataire at the end of the war. Then in 1950, it purchased a plant at St. Dizier for tractor production. At first, most of the tractor parts were imported from the U. S., but by 1954 the tractor is expected to be all French made and ultimate production target of 7,500 tractors a year will help create many new jobs.

Back in 1939, International Harvester Co. of Australia Pty., Ltd., established a plant at Geelong, Victoria. But the war interrupted the program. The war over, the company swung back into full production of farm equipment and service parts. To this capacity was added in 1949 a huge, modern, £1-million plant at Dandenong, Victoria, for manufacture of

FRONT COVER—"To build and distribute products for the betterment of individuals and entire nations everywhere"—that, in the words of President J. L. McCaffrey, is the IH creed.

***BRAZILIAN AIR STRIP** is being widened with International TD-18 tractors pulling Bucyrus-Erie scrapers; IH equipment is also at work on roads, airports, all kinds of construction jobs*

motor trucks. American truck designs were modified to meet the grueling conditions of Australia's back country.

Meanwhile, International Harvester was not neglecting Latin America. At Saltillo, Mexico, construction of that country's first modern farm-machinery factory was begun in 1946. It manufactures small, low-priced walking plows, one-hole corn shellers, cane carts, one-horse cultivators, and similar small tools. These tools go to Mexican farms, other Latin American countries, and the Caribbean Islands.

Farther south, in Brazil, International Harvester Maquinas, S.A., in 1949, began construction of a factory and parts depot at Santo Andre. The plant, to be finished this year, has already brought about more economical assembly of trucks, tractors, farm and road-construction machines.

All this expansion has put International Harvester up among the leading business organizations of the world. In 1951, Harvester's domestic sales alone ran to over $1-billion. Another $200-million of goods went to subsidiary companies, and the foreign subsidiaries themselves chalked up a resounding $370-million sales figure.

The company has invested about $60-million in foreign subsidiaries. This investment in international trade has made 26,500 jobs available to foreign nationals. It is a direct expression of the beliefs held by Harvester officials that free competitive enterprise is the sole workable policy and that as customers are helped to raise their living standards, a reasonable profit can also be made.

Let's Look at Brazil

To understand how International Harvester has contributed to the economies of many nations, let's look at the effect of its operation and use of its equipment in Brazil. Railroads there fill only a small part of the transportation needs, so trucks must haul the goods from farm and factory and mine to market. The 200 Harvester dealers spread from Belem at the mouth of the Amazon to Porto Alegre in the far south fill that need with trucks from Santo Andre.

Trucks alone are not enough. Roads must be built and maintained. Heavy TD-24 crawler tractors equipped with road-construction machines and the versatile TD-18 and 9 and the ID-9 tractors are helping to build those roads. Tractors are working too in building airports and landing fields.

Brazil is industrializing her economy.

Her factories and mines need the industrial equipment supplied by IH Maquinas. IH motors are driving rock crushers, cotton gins, pumps, elevators, power shovels, concrete mixers, boats. IH engines and tractors are at work in oil fields, and its diesel power units find wide application in production of electric current.

And while Brazil is moving toward industrialization, agriculture too is being mechanized. Thousands of Harvester farm machines and tractors have contributed substantially to that mechanization in the past 25 years. The sugar-producing regions, for one, are watching heavy disk plows and other special machines, drawn by crawler tractors, supplant the muscle-powered hoe.

International Harvester's Scope

The primary purpose and functions of International Harvester and its 19 foreign subsidiary organizations are to manufacture, distribute, and service its many products. But its work abroad has by no means been limited strictly to these business-like operations.

International Harvester in one of its challenging contributions to the welfare of an individual nation helped write a new chapter in Philippine's agricultural history. That chapter could be called, "The Bukidnon Story". For it was at Marmag in the Province of Bukidnon on the island of Mindanao that the Philippine Republic initiated a project to increase the yield of rice, corn, peanuts, and other crops by introducing scientific farming methods and modern machinery.

The Republic, besides buying three-quarters of a million dollars worth of equipment from the International Harvester Co. of Philippines, asked the company to supply field and technical assistance. So in 1949 two top farm research men were sent from Australia to train machine operators and to plan the necessary soil-conservation measures.

As the land was cleared, the highly receptive Filipinos became skilled operators; then proper contouring and terracing followed the land-clearing job. When the two Harvestor men left, 1,957 hectares were cleared, plowed, and planted and 3,000 hectares more were surveyed, ready for clearing.

The result: This upland rice-farm project yielded 60 cavanes per hectare —against an average elsewhere of no more than 20 cavanes. The huge island, with three-fourths of its land still covered with forests, could easily meet Philippines' needs for rice and at the same time become the most abundant rice-basket for all the Far East.

Another interesting Harvester project has been the publishing in Australia of a book on pasturage. It has effectively guided dairymen and farmers on the most efficient use and care of the soil. It tells them how contour plowing improves grassland output and prevents erosion of valuable land; it tells how to build nitrogen reserves in the soil, to top-dress poor land, to plant the right kind of grass.

Latin America, Too

And throughout Latin America too, International Harvester has provided technical assistance to many nations. In this promising potential market, Harvester experts have directed clearing of jungle and brush lands, building of roads and dams, irrigation, soil preparation, crop rotation.

These programs and others like them have built for International Harvester good will in all parts of the free world. Important too has been the company's looking on the international market as one well worth consistent attention. All these things, and the quality of its products, too, have made the red IH pylon a familiar, friendly symbol everywhere.

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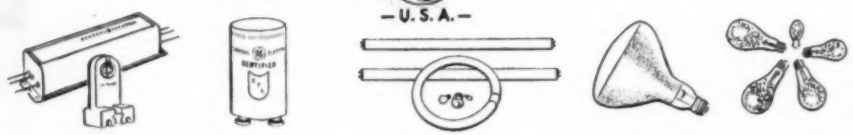

PRODUCTION IDEAS

from Manufacturers' Catalogs

5-1 Welding Design—Eutectic Welding Alloys Corp. 72p. "Manual of Welding Design and Engineering" contains detailed data on many welding alloys.

5-2 Synthetic Organic Chemicals—Airco Co. International. 68p. Catalog 47-6 gives complete data on Sharples synthetic organic chemicals.

5-3 Research Operations — International Harvester Export Co. 12p. "Organized Curiosity, Inc." is a picture story of firm's research team checking product quality.

5-4 Inductrols — International General Electric Co. 28p. Bulletins GEA-5571 and GEC-795 describe inductrol power packs, and single-phase inductrols for indoor service.

5-5 Spray Painting—Binks Manufacturing Co. 116p. Catalog 955 covers complete line of spray painting and finishing equipment.

5-6 Soil Compaction—Barco Mfg. Co. 8p. Portable gasoline "Rammer" for soil tamping is described in bulletin 621.

5-7 Punches and Dies—F. J. Stokes Machine Co. 16p. "How To Save Money on Punches and Dies" tells how to keep equipment in best condition.

5-8 Power Pumps—Food Machinery and Chemical Corp. 28p. Booklet L-841-5M-6. 5-AAP covers four types of high-pressure industrial power pumps.

5-9 Radial Saws—Delta Power Tool Div., Rockwell Mfg. Co. 12p. Complete line of Multiplex radial-arm saws is described in catalog M50.

5-10 Aircraft Hydraulic Fluid—Monsanto Chemical Co. 20p. Booklet gives general properties of Skydrol, a synthetic nonflammable type of hydraulic fluid.

5-11 Heating, Ventilating—Trane Co. 36p. Complete line of heating, ventilating, air-conditioning, and heat-transfer equipment is illustrated in bulletin PB-290.

5-12 Vibratory Compactor—Jackson Vibrators, Inc. 10p. Form No. JV Compactor 951-15M K illustrates compacting asphalt, granular soils, and other such materials.

5-13 Air Compressors—DeVilbiss Co. 20p. Catalog CL gives features of compressors and compressing outfits. Has section on components and accessories.

5-14 Learn by Mail—International Correspondence Schools. 94p. Entitled "Looking Ahead," it lists home-study courses offered for training workers.

5-15 Industrial Chemicals—Oronite Chemical Co. 32p. Technical Bulletin 1-3-50 describes sodium sulfonates. Oronite wetting agent is described in Technical Bulletin 1-12-45.

5-16 Drilling Machines—Cincinnati Lathe & Tool Co. 8p. Catalog D-108 covers outstanding features of C-O Cincinnati 16-in. 3000 Sliding Head drill.

5-17 Double-pitch Roller Chains—Chain Belt Co. 12p. How to cut costs and weight with Baldwin-Rex double-pitch roller chains is told in bulletin 51-2.

5-18 Natural Rubber — Natural Rubber Bureau. 28p. "Natural Rubber and You" is a story of rubber—its history and sources.

5-19 Cylindrical Grinders — Landis Tool Co. 28p. Two sections describe standard and special purpose grinding machines in General Catalog CG-52.

5-20 Coil-winding Machines—Geo. Stevens Mfg. Co., Inc. 32p. Catalog describes complete line of coil-winding machines, applications, and accessories.

5-21 Diecarb—Firth Sterling Steel & Carbide Corp. 14p. Grades, application, design, and maintenance of Diecarb, sintered carbide, is covered in Technical Data Sheet 70-001.

5-22 Road Machinery—J. D. Adams Mfg. Co. 8p. Form 5110 describes and illustrates all its road-building equipment.

5-23 Electrical Drives—Electric Machinery Mfg. Co. 24p. "E-M Synchronizer No. 34" tells how electrical drives are applied for variety of industrial jobs.

5-24 Electric Contact Controllers—Minne-

PRODUCTION IDEAS (Cont.)

apolis-Honeywell Regulator Co. 16p. Vane-type electric contact control units are illustrated and described in catalog 8000.

5-25 Material Flow Conveyors—Rapids-Standard Co. 28p. Catalog GC-52 has a section each on gravity conveyors, powered conveyors, and hand trucks.

5-26 Diamond Core Drills—E. J. Longyear Co. 4p. General Bulletin 83 describes drills and related power equipment.

5-27 Insect Killer—Hercules Powder Co. 8p. Data in bulletin 400-444 shows effectiveness of Thanite as toxicant.

5-28 Power Belting—Manheim Manufacturing & Belting Co. 12p. Form 30M-8-47 covers VeeLink, the link V-belt. Form 30M-4-49 describes Suregrip Balata flat belting.

5-29 Contour Machines—DoAll Co. 16p. Three machines-in-one for band sawing, filing, and polishing operations is possible as described in form No. 51-705.

5-30 Milk Agitation—Ingersoll-Rand Co. 8p. Booklet 1523 illustrates and describes compressors for oil-free air agitation of milk and milk products.

5-31 Materials Handling—Frank G. Hough Co. 22p. Forms 205 and 208 cover gasoline and diesel Payloader tractor shovels and tell what they can do.

5-32 Induction Heating — Westinghouse Electric International Corp. 12p. Booklet B-4782 tells how induction heating increases production and cuts costs.

5-33 Frozen Metal—Deepfreeze Distributing Corp. 8p. Folder describes advantages of very low-temperature metal treatment.

5-34 Belt Conveyors—Link-Belt Co. 24p. Paper 51-A-150 tells how advanced engineering and materials have boosted efficiency and versatility of belt conveyors.

5-35 Microhoning Equipment—Micromatic Hone Corp. 12p. Booklet AR-119 gives specifications of Microhoning equipment for cylindrical and flat surfaces.

5-36 Industrial Scales—Toledo Scale Co. 40p. Catalog C shows how to control costs with wide selection of scales offered for many industries.

5-37 Fan-cooled Motors — Allis-Chalmers Mfg. Co. 6p. Bulletin 51B7149B describes totally-enclosed, fan-cooled motors with tube-type, air-to-air heat exchangers.

5-38 Grinders—Sheffield Corp. 20p. Folder MFG-122-51 tells use of Micro-Form Grinders. Catalog TFG-13579-51 describes precision thread and form grinders.

5-39 Air Conditioning—Servel, Inc. 30p. General description, application, and capacity data on gas-operated air-conditioning equipment are covered in form OAC-81-25R2.

5-40 Aluminum Powders—Reynolds Metals Co. 84p. Manual covers development, production, applications, characteristics, testing, evaluation, handling, and storing of aluminum powders and pastes.

5-41 Fork-lift Trucks—Towmotor Corp. 32p. "The Inside Story of Towmotor" provides basic information on its line of fork-lift trucks.

5-42 Bin-level Control—Stephens-Adamson Mfg. Co. 4p. Bulletin 11-0 covers switches for bin level control.

These manufacturers' catalogs will be sent free to subscribers. Fill in squares with catalog numbers desired and mail to the Editor, McGraw-Hill Digest, 330 West 42nd St., New York 36, N. Y., U. S. A.

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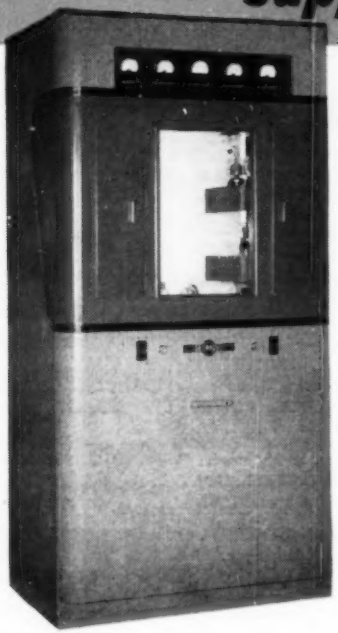

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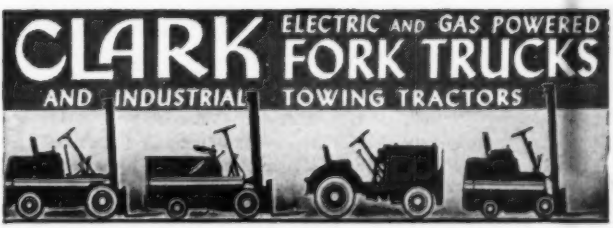

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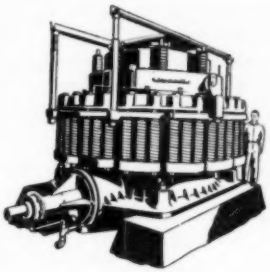

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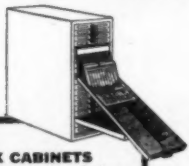

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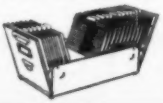

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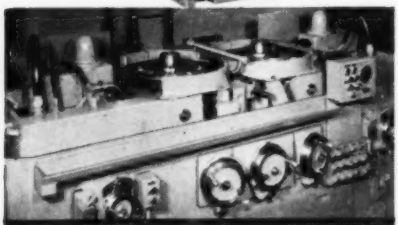

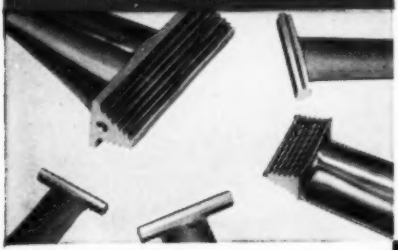

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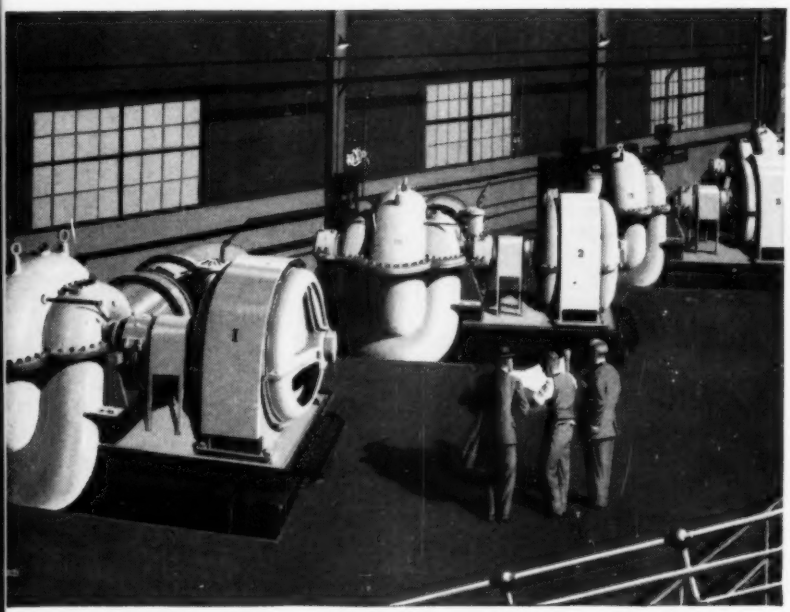

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